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1874.

Map of a portion OF AFGHANISTAN

From Surveys made before the Evacuation of Candahar and Cabul.

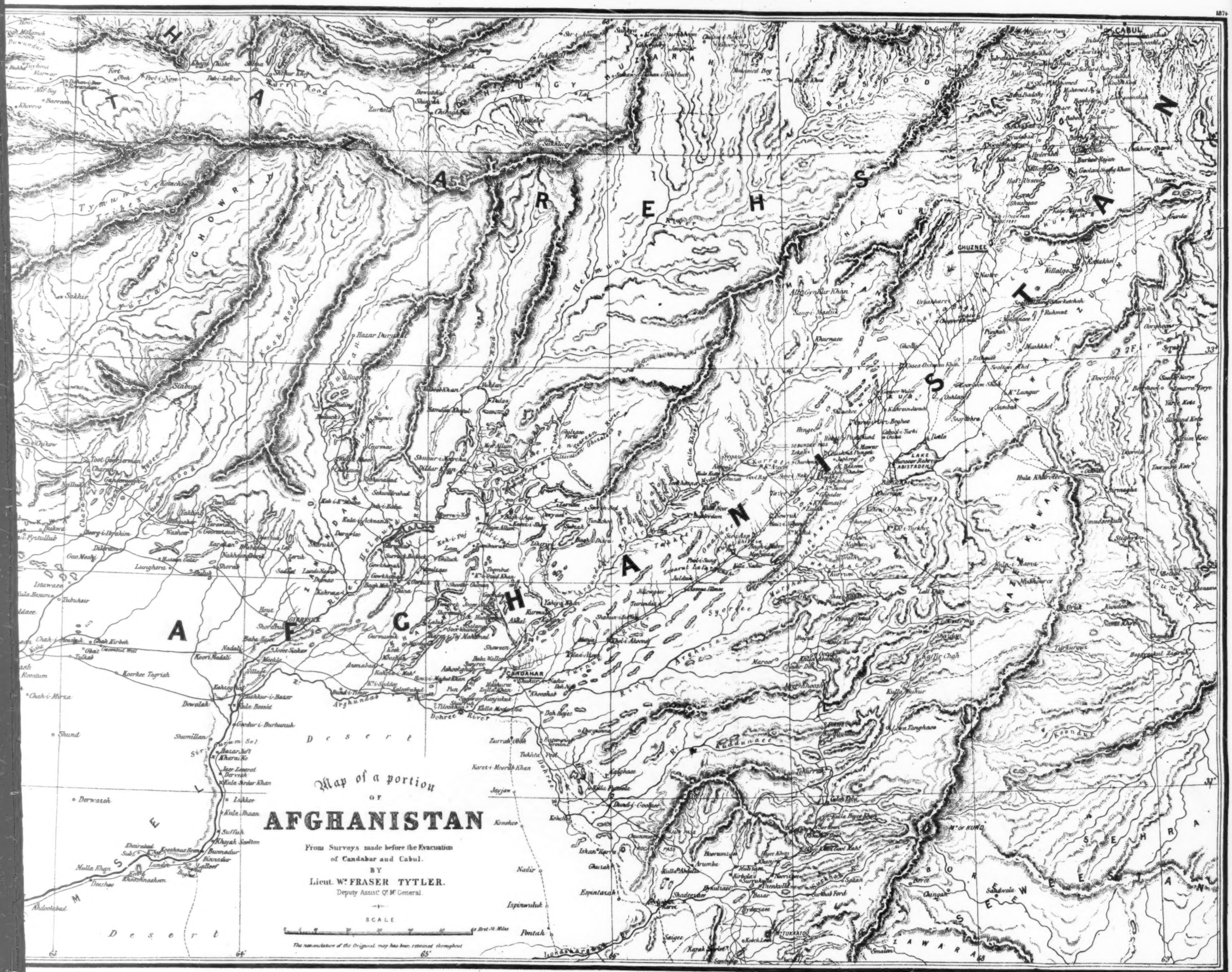
BY

Lieut. Wm FRASER TYTLER.

Deputy Assist. Qr Mr General.

SCALE

The nomenclature of the Original map has been retained throughout


CABUL
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Desert
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Helmund
Arghundab
Dohree River
Kash Road
Toot Ghoor Road
Kuttra Road
Tymuni Road
Ghorree Road
Koorree Tagrish
Dehra Ismael Khan
Kohat
Peshawur
Attock
Jellalabad
Candahar
Ghuznee
Cabul
Khelat
Quetta
Sukkur
Shikarpoor
Dadur
Bukkur
Sehwan
Kelat
Pishin
Kojuk
Khoorma
Baneen
Kaha
Kurrum
Sheranee
Ghilzye
Kakur
Duranee
Khyberee
Jadran
Mangul
Kuzzilbash
Hazara
Kohistan
Kafir
Koondooz
Meer Khoosh
Kuttawaz
Kuttaghan
Nadir
Espintarah
Ispinwuluk
Pontah
Khodeabad
Deeshoo
Nullah Khan
Dewalah
Shumillan
Shund
Derwaish
Sukkur
Sehwan
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THE

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APRIL, 1874.

THE BASIN OF THE HELMUND.

THE basin of the Helmund, including all the streams which flow down into the great lake or swamp of Sistan, lies right athwart the line of advance from the north towards India. It forms the natural outwork and bulwark of our eastern empire, and it would, therefore, be difficult to over-estimate the importance of an accurate knowledge of its geographical features. Yet such knowledge as the zeal of British officers has been the means of collecting, has, in several instances been strangely neglected, while a large part of the area in question is still entirely unknown.

The map, a portion of which we reproduce, was compiled from original materials, in 1845, by a distinguished officer who served in the Afghan campaign. It contains much material, which has never been published in full detail, and still remains in manuscript. It will be the object of the present article to give some account of the existing materials whence a knowledge can be obtained of the region comprised in the basin of the Helmund.

A glance at the map will show the leading features of the Helmund catchment basin. At the north-eastern corner is the continuation of the Hindu-Kush range, called the Koh-i-baba, whence extend westward the two parallel mountain chains of the Safid-koh and Siah-koh, enclosing the lateral valley of Herat. The Safid-koh is the Paropamisus of the ancients. The distance between Herat and Kabul, which cities are nearly in the same latitude, is over 350 miles; and this space is occupied by lofty and rugged mountains, cut by deep ravines, containing the sources of the Helmund and its tributaries. Here dwell the wild Hazarehs and Eimaks, in a region covered with deep snow during the winter months, and affording pasture for cattle in the summer. There are records, preserved by Macartney, of Mahmud Shah and other Afghan princes having marched from Herat direct to Kabul. Eldred Pottinger travelled from Herat to Kabul, but north of the Hazareh country, and his route is not laid down on our maps, and General Ferrier made an unsuccessful attempt to penetrate across the mountains. No modern traveller has ever thoroughly explored the Hazareh region. It consists of the lofty ridges and peaks of the Siah-koh, and of the long spurs which confine the rivers in their upper courses, and gradually slope down towards the deserts of Persia and Baluchistan. The river Helmund is the leading feature of the region comprising the basin which bears its name as it divides it into two parts diagonally, and must be crossed by any force advancing from Herat to India. It is the only important river between the Tigris and the Indus. Rising in the Koh-i-baba, it flows in a south-westerly direction through the Hazareh country in a deep gorge for 260 miles, and then, emerging on the open country, it sweeps in a bold curve over the Garmsil (*Gurmsel* of the map), in a course of another 100 miles, and empties its waters into the Sistan Lake. On the western side of the Helmund, the drainage of the region is effected by three important streams, all with independent courses to the Sistan Lake, the Adraskan (*Rood-i-Subzawar* of the map), Furrah-rood, and Khash-rood. On the east side the various rivers, the Turnuk, Arghasan, and Dori (*Dohree*) unite with the Arghundab, the principal tributary of the Helmund.

The Helmund Basin is divided into two distinct regions: the mountainous gorges through which the rivers flow for at least half their courses; and the plain upon which they finally emerge, which sinks, in a succession of desert steppes, to the lowest depression at the Sistan Lake and its swamps. The mountainous region, with the exception of the routes taken by officers during the Afghan campaigns, is entirely unknown. The three roads from Herat to Kandahar skirt the foot of the mountain spurs, and have frequently been traversed by European travellers; and others have passed over the plain country of Furrah, Sistan, and the Garmsil in various directions.

Our earliest definite knowledge of the Helmund Basin is derived from the mission of Mountstuart Elphinstone to Afghanistan in 1808. The surveyor of the Mission was Lieutenant John Macartney, who was indefatigable in collecting geographical information, with which he compiled a valuable map and an excellent memoir; but this promising officer died before the publication of the first edition of Mr. Elphinstone's work in 1815. A portion of Macartney's Memoir is printed in an appendix to his chief's book; and the whole manuscript, a precious storehouse of information, is preserved in the Geographical Department of the India Office. Macartney's map was for many years the best authority for the countries on the north-western frontier of India.

Captain Christie was the first English officer to cross the Helmund. He was one of that able staff which did such splendid service during Sir John Malcolm's second mission to Persia; accompanying Pottinger in his journey through Baluchistan in 1810. On March 22nd Christie parted company with Pot-

tinger at a place called Nushky, which has never since been visited, and took a north-westerly course over the desert to the valley of the Helmund, a distance of 190 miles. He reached the river at Pullaluk, where it curves round the Garmsil, before flowing northwards to the Sistan Lake. He crossed the Helmund near Rudbar, on the 31st of March, and again close to its mouth, without knowing it; and traversed the isthmus which then existed between the *Hamûn* or larger portion of the Sistan Lake, and the Duk-i-teer, or smaller basin, which received the Khash-rood. He thus reached Furrah, and travelled thence by Herat to Yezd. An abstract of Christie's journal forms an appendix to *Pottinger's Travels;* and a map showing his route was printed by Colonel Garstin, the Surveyor-General, in 1811. Christie travelled in disguise, and he took no observations for latitude or longitude.

The next Englishman who explored any portion of Western Afghanistan, was Edward Conolly, brother of the brave and accomplished officer who was afterwards murdered at Bokhara. Accompanied by Serjeant Cameron, Captain Conolly made an adventurous journey, in 1839, from Persia to India, by Herat and the Sistan Lake, which he was the first to describe with any precision, in his "Sketch of the Physical Geography of Sistan," published in the *Journal of the Asiatic Society of Bengal* (vol. ix., p. 710). He found that in 1830 a great inundation had entirely altered the face of the country as it was when Captain Christie traversed it in 1810. The main stream of the Helmund had deserted its old bed, and cut for itself a wide channel into the Duk-i-teer, the smaller lake at the north-east corner of the depression. This accession of waters then forced a communication between the Duk-i-teer and the main lake, breaking away the isthmus crossed by Christie. The lower or Dilaram road, from Candahar, by Girishk on the Helmund, to Furrah and Herat, skirts the foot of the mountains, whence a vast desolate tract stretches away to the westward, descending in steppes to Sistan, which is the lowest depression. It receives into its shallow swamps the whole discharge of this great inland river system. It has only one hill, the Koh-i-Khwajah, an island when the lake is full, which was visited by Conolly, in September, 1839, and by Major Lovett in 1872, (see *Ocean Highways*, for October, 1873, p. 279). The Hamûn (Hamoo of the map) is a Persian word, meaning a plain, level ground, or any expanse of water; and it is well applied to the depression which receives the Adraskan, Furrah-rúd, Khash-rúd, and Helmund. These rivers rush down with great violence during one period of the year, and are almost black with mud, while at others some are dry, and the others flow in clear shallow streams.

Conolly describes the effect of these periodical floods on the great shallow lake, which is not more than 4 feet deep. The water hurries away to the lowest spots, and there drops its loads of earth, until, in process of time, these low spots become elevated, and the water is driven off to some other place. Hence the levels are constantly altering, and the whole bed of the lake is gradually being filled up. The water, consequently, has a tendency to spread over a larger surface every year; layer after layer of deposit diminishes the slope, and nearly all the rivers overflow their banks on entering Sistan. But these natural causes are counteracted by irrigation works. Large bodies of water are drawn off in canals, flowing sometimes for 40 miles, through dry and sandy tracts; and massive bunds and embankments have been constructed, to confine the waters within certain bounds, for purposes of cultivation. Conolly found the lake of Sistan, in the vicinity of Koh-i-Khwajah, to be salt. Sir F. Goldsmid's officers reported it to fresh at the northern end. This is accounted for by their proximity to the mouths of its chief affluents, bringing down large volumes of fresh water. In the same way the water of the Caspian is fresh, even out of sight of land, near the mouth of the Volga.

Conolly's surveying work was executed by Serjeant Cameron, who was afterwards murdered in the Khaibar Pass, excepting the route across the desert from Sistan to Kala Bisht on the Helmund, which Captain Conolly himself sketched, as his companion was struck down with fever, and had to be carried on a litter. Conolly's map was published at the time in the *Journal of the Asiatic Society of Bengal*, and it was reproduced in the Quarter-master-General's Office at Simla, in 1872, on a scale of 8 miles to an inch. The original is at Calcutta.

At the commencement of the Afghan invasion, a large map of Afghanistan was prepared on a scale of 8 miles to an inch, in fifteen sheets. It is dated 1840. The materials for it, as regards the Helmund Basin, are Captain Christie's sketch of his route; Captain Conolly's map of Sistan; Sanders's route of the mission from Kandahar to Herat, and part of the Hazareh region from native information collected by Eldred Pottinger. The course of the Helmund is only given for a few miles above Girishk, and all the space between the Turnuk and the Helmund, east of Kandahar, is blank. This map appears to have been long unknown to map-makers in Europe, but there is now a copy of it in the Geographical Department of the India Office.

During the Afghan war the officers, who marched in many directions over a previously almost unknown country, were indefatigable in collecting information; and it is deplorable that so much of their material should never have been fully utilized. Major (now Sir Henry) Rawlinson was stationed at Kandahar, and, in the rare moments that he could snatch from his pressing official duties, he studied the comparative geography of the surrounding country. He also despatched his political subordinates on various missions, and their observations secured the accumulation of material for positive geography. Other officers were busy in the same field of research. In December, 1838, the present Colonel W. Fraser Tytler received orders to proceed to Afghanistan with the army of the Indus, as assistant in the Department of Colonel Garden, the Deputy Quarter-master-General. He remained in the country until December, 1842, when he returned in charge of the departmental duties of General Nott's force. He devoted the whole of his spare time to the collection of geographical information, both by executing surveys himself, by supplying officers who were sent on political missions with compasses and instructions for laying down their routes, and by obtaining copies of the work of engineers and other surveyors. The valuable materials thus amassed includes much that is hitherto unpublished:—

I. A detailed map of the country round Herat, between the meridians of 62° and 63° E., and the

parallels of 34° and 35° N.; including Badkhys to the north, and Shafihân to the south. Badkhys, in the valley of the Murghab, is the most northern district of Herat, and is mentioned in Abbott's work; but is not shown as a district on most published maps. It is obviously a position of great political importance. This Herat map is from a survey by Captain Sanders and Lieutenant North, who accompanied Major Todd's Mission to Herat in 1839. The former, afterwards Colonel Sanders and Military Secretary, fell at the battle of Maharajpúr. General North is, we believe, still alive.

II. A route from Kandahar across the Argundab, and north as far as a place called Goonda, in the direction of the Helmund.

III. A survey of the district of Nesh, between the rivers Argundab and Helmund.

IV. About 50 miles of the course of Helmund, above Girishk.

V. Another 50 miles of the upper course of the Helmund, with a mountain tributary called the Khood, and some routes to the eastward. This takes the survey of the river to 33° N.

VI. The district of Teereen, and the courses of the Teereen and Gurumah Rivers, tributaries of the Helmund. The original sketch contains a great number of names, and other details not on the general map.

VII. The country on the right bank of the Argundab. to the east of Nesh.

The above are by Captain Sanders and Lieutenant North; but Colonel F. Tytler also went over the ground.

VIII. A survey of the river Bugran, a tributary of the Helmund, which rises in the Siah-koh, and joins the main stream on its right bank, a few miles above Girishk, by Lieutenant Cooper.

IX. A route down the Helmund, from Kila Beisht, at the junction of the Argundab, to Rudbar, including the whole country of the Garmsil, with the positions of thirty-two villages, and connecting Captain Christie's point at Pullaluk with Kandahar. This important piece of work was executed by Lieutenant Patterson, who was despatched on a mission in this direction by Sir Henry Rawlinson. Colonel Fraser Tytler supplied him with a compass and some instructions, and protracted the route on his return. Lieutenant Patterson was soon afterwards murdered by some mutinous troops at Kandahar.

X. A careful and detailed survey of the valley of Kandahar, by Colonel Fraser Tytler, down to the junction of the Argundab and Dori (Dohree). The latitude of Kandahar fixed by Captain Sanders at 31° 36′ 30″ N.

XI. The district of Kakrez, between the Helmund and Argundab, with much detail, especially on the right bank of the latter river.

XII. A route down the upper part of the valley of the Argundab, by General Lynch, which has never been embodied on any map.

In addition to all this material, the country to the eastward, especially the Guwal Valley, and the region of lake Abistadeh, was surveyed by Lieutenant Broadfoot; and partly by the Bombay force under General Willshire. The routes from Kandahar up the valley of the Turnuk, by Khilat-i-Ghilzi and Ghazni to Kabul; and from Kandahar, by Girishk, to Herat, were carefully surveyed, and are well known. But the valuable work of Lieutenant Sturt from Kabul to Bamian was unfortunately lost.

As soon as the Afghan was war over, Colonel Fraser Tytler, in 1845, with the rich materials that he had so carefully collected, began the compilation of a general map, and completed it in intervals snatched from arduous service, during the following two years. It is entitled:—"Map of the Western States of India, and of Afghanistan, including parts of Baluchistan and Turkistan, containing the last surveys made before the evacuation by the British troops of Candahar and Cabool: by Lieutenant William Fraser Tytler, Deputy-Assistant-Quartermaster-General of the Army." (Scale 16 miles to 1 inch.) The map extends from the mouths of the Indus to Bokhara, and from the Sistan Lake to the longitude of Delhi. This map, with the original surveys, is the most important geographical work connected with the Afghan war. With the cordial assent of Lord Gough, the Commander-in-Chief, and of Colonel Garden, the Quartermaster-General, who spoke most highly of its value, the map was forwarded to England, and presented to the Court of Directors, with a memoir, through Captain Tytler's father, who expressed "an earnest hope that it might be found an acceptable addition to the geographical knowledge of those countries." The sequel is almost incredible. The Court of Directors at first refused to accept the map, because it had not been received through the regular official channels!! Eventually a cold acknowledgment was given, and the portion of the new work, as given on Colonel F. Tytler's compilation, was embodied on a revised edition of Mr. Walker's map, which was issued in 1857. Fortunately Colonel Fraser Tytler recovered his materials again, on his return to England, or they would probably have been lost, as has been the fate of so many other equally valuable documents, previous to the formation of a Geographical Department at the India Office. Colonel Fraser Tytler has now deposited the map, and the original surveys on which it is based, in the Department; and no future map of Afghanistan can properly be published without using these materials, which have thus become accessible, after having been neglected for the last thirty years. We cannot but hope that the gallant officer who did so much for geography during the Afghan war, will feel satisfaction that his labours and the materials he collected will at last meet with the appreciation they deserve. There will now be a permanent record of his work, and of that of his brother officers, Sanders, Patterson, Cooper, and North; and their labours will be utilized by future geographers and map-makers.

We suspect that one reason for the neglect of Colonel Fraser Tytler's original materials was that the map of Mr. John Walker, the geographer to the East India Company (See *Ocean Highways* for May, 1873, p. 81), had already been published, and that they arrived too late. Walker's "Map of the countries on the North-West Frontier of India, compiled chiefly from surveys by Lieutenant Wood and Major Leech," appeared in 1841, and a revised edition was issued in 1857. The first edition contains none of the work we have enumerated as having been collected and embodied in the map by Colonel F. Tytler. We publish a lithographed copy of the portion of Colonel Fraser Tytler's map which embraces the basin of the

Helmund, besides including Herat and Kabul. It will give an idea of the value and originality of this admirable compilation. But it is necessary to explain that the original sketch surveys, being on a larger scale, contain very much more detail than the map which embodies their main features. In a letter from Kandahar (*Royal Geographical Society's Journal*, xii., p. 114), Sir Henry Rawlinson wrote, in 1840, that "the accumulation of materials of positive geography is going on steadily and satisfactorily." He added, "I trust that the Indian Government will not delay much longer to display their treasures to the world." The delay has been continued to the present time; and, while some of these treasures have now been brought to light, others have been irremediably lost during thirty years of neglect and indifference.

After the Afghan war, General Ferrier was the first European to enter the valley of the Helmund. In 1845 he was at Herat, and he made a journey into the mountainous region of the Hazareh, visiting Zerni, the ancient capital of the Gour Dynasty (A.D. 1150-1214). He then took the upper road, along the skirts of the mountains from Herat to Girishk, and afterwards marched along the banks of the Helmund to Sistan. The General appears to have been engaged in a running fight with Baluchis, mounted on dromedaries, during this part of his journey, which gave him little time for geographical work. Ferrier, however, has added some names of villages on the right bank of the river. His original sketch-maps are in the Geographical Department of the India Office.

In 1857 Major Lumsden was at Kandahar, with Lieutenant Lumsden and Dr. Bellew, on a diplomatic mission; but, although they went by a new route and much valuable information was collected, their movements were jealously restricted, and little or no actual surveying work was executed. They returned to Peshawur in June, 1858.

M. Khanikoff, in 1860, made a journey from Herat to the south, as far as Lash-Jowain, near the northern shore of the Sistan Lake, and fixed several positions with considerable accuracy. He made a large correction in the latitude of Lash-Jowain, as laid down by Christie and Conolly, which indicated the further alterations that have since been made in the position of the lake by Sir Frederic Goldsmid's party. It is not, however, to be wondered at that Pottinger and Christie should have been so far out in latitude, when it is remembered that they travelled in disguise, often at night, and were unable to use any instruments but a watch and compass. Major Lovett, in 1872, made a survey of a portion of Sistan, which showed that the point where the waters of the Helmund are diverted for irrigation is laid down, on Mr. Walker's map of Afghanistan, 20 geographical miles too far north; and the furthest south point reached by the Helmund about the same distance. Major Lovett's survey extended to a point not very far from Rudbar, the furthest point reached by Lieutenant Patterson from Kandahar, in 1840. The small interval can be satisfactorily filled from the notes kept by Sir Richard Pollock and Dr. Bellew during their journey from Kandahar to join Sir Frederic Goldsmid's party in Sistan.

Sir Richard Pollock left Kandahar on the 13th of February, 1872, and reached Rudbar on the 20th, travelling along the banks of the Helmund. The river banks are fringed with an almost continuous succession of villages, corn-fields, and gardens; while to the south all cultivation is bounded by the billowy surface edge of the desert. The river was at its lowest, but the bed was 300 yards across, and there must be a magnificent volume of water when the stream is full. At places the cliffs of the desert come close to the river, at others they recede and leave a wide expanse of pasture and cultivation, while thickets of reeds and tamarisk, abounding in wild hogs, line the banks of the river. Although Sir Richard Pollock took no astronomical observations, his diary was very carefully kept, and his bearings and distances satisfactorily connect the work of Patterson with that of Lovett.

These brief notes of previous travels in the valley of the Helmund, and of the geographical material that has been collected, show that a new map of Afghanistan, containing fuller and more accurate details than are to be found on any that has hitherto appeared, might now be published. The want of any uniformity in the transliteration of names is also a crying evil, as regards all existing maps. Our remarks also show that very much remains to be done, and that a large area is yet unexplored. It comprises a region which, as Sir Henry Rawlinson wrote from Kandahar in 1841, presents a noble field for comparative geography, while its physical aspects are not less interesting and important.

Political considerations will probably lead to a more thorough examination of Western Afghanistan before very long; for its strategical position, natural strength, and the warlike disposition of its inhabitants, seem to fit it, in friendly hands, to become the outwork and bulwark of Hindostan. With this view, Lord Lawrence established the present ruler on the throne of Afghanistan, by assisting him with large presents of arms and money, and the same policy was persevered in by Lord Mayo, with most satisfactory results. The Amîr Shîr 'Âly declares himself to be our ally and dependent, that our enemies are his enemies, that he would be glad to have his army instructed by us, and his strong places and communications improved under our direction. A well-trained and friendly Afghan army could be of the greatest service to the Government of India; and it only remains to complete the policy adopted by Lord Mayo, at Ambala in 1869, to secure this result. The fort at Girishk, on the Helmund, between Herat and Kanhadar, and commanding the roads, should be strengthened; as well as the forts at Furrah and Lash-Jowain. They could be made very formidable at a moderate outlay, and a few hundred miles of improved commercial and military roads would well repay the cost. It would be an advantage too, with a view to maintaining a close alliance, that the relations between the Indian and Afghan Governments should be more intimate. Since 1856 we have had a native agent at Kabul, and a news-writer at Kandahar. But it is a political necessity that the topography and statistics of countries which are the fields of our diplomatic efforts should be studied; and it is most important that a British agent should be deputed to Kabul or Kandahar. If this is done, and if English officers hereafter instruct the Amîr's army and superintend his military works, the basin of the Helmund will be thoroughly explored, and a complete geographical knowledge will at length be acquired of Western Afghanistan.

CAPTAIN PRSHEVALSKI'S TRAVELS IN MONGOLIA.

STAFF-CAPTAIN N. M. PRSHEVALSKI, of the Russian army, known for his previous explorations in the Amur and Ussuri country, left St. Petersburg in August, 1870, with the intention of exploring Mongolia and Tibet, and, if possible, entering India by way of H'Lassa and the Eastern Himalayas. Although he has failed in this latter part of his scheme, he has acquired most valuable scientific information which, combined with the map he intends shortly to publish, will shed a flood of light on the geography, zoology, and botany of Mongolia and Northern Tibet.*

He commenced on the 25th of February, 1871, by making a preliminary journey to lake Dalei Nor, by way of the town of Dolonor, which lies 150 versts south of it. He then returned to Kalgan, which he reached on the 24th of April. During this excursion he made height observations, especially in the mountains north of Peking which fringe the great Mongolian plateau, and arrived at the conclusion that the lofty Petcha Mountain of Ritter had no existence. At Kalgan he commenced preparations for his great journey.

On the 3rd of May (o.s.), 1871, Captain Prshevalski and his fellow traveller M. Pyljzov, accompanied by two Cossacks, a trusty greyhound called "Faust," and with an equipage consisting of eight camels and two horses, set out from Kalgan in the direction of the Ordos country. The greater portion of the baggage consisted of guns and ammunition, as they knew that in some districts the unfriendliness of the Chinese, and in others the devastation effected by the rebellion of the Tungans, would oblige them to depend on their own guns for supplying food. The road lay in a south-westerly direction about 80 versts to the north of Kuku-choto. When about 100 versts distant from Kalgan, they fell in with three Belgian Catholic missionaries, who greeted them most warmly. In the same remote village they met Samdachemba, the old guide of Messrs. Huc and Gabet, in 1844. He is fifty-five years of age, but recalled several incidents of his journey with those energetic missionaries to H'Lassa; and Prshevalski would have fain persuaded him to accompany them now, but the old Chinese said he was too far advanced in years for such a journey.

Once out of the main route to Kiachta, the face of the country changes: the mountains grow loftier, rocks occur more frequently, and the soil, half loam, half sand, bears less grass, the plentiful water supply to the north of the Kiachta route disappears, and the valleys merge into dreary steppes. Sandy and stony beds of streams there are, but these are only filled during the rainy season, while wells are scarce, and the Chinese jealously occupy every valley likely to prove fertile. Year by year, as cultivation advances, the Mongolian shepherds and their flocks, and the fleet antelopes, are driven further northwards in the direction of the Great Gobi desert.

The highest mountains passed by the travellers were the Shara-chad and Suma-chad, under 6000 feet in height, and frequented by wild sheep (*ovis Argali*), who, however, belied their character by their great tameness.

The "merrie month of May," in these regions proved anything but genial. Continual gales of wind and morning frosts held on till the middle of the month, and on the 24th and 25th there was a violent snowstorm. This in a country forty-one degrees north of the equator—the latitude of Naples—naturally strikes a stranger with astonishment. It retards the crops, sowing usually taking place about the end of May or beginning of June.

Towards the end of June the Inshan was reached, a high and steep mountainous mass, from 25 to 30 versts in breadth, rising from the left bank of the Hoang-Ho. It differs essentially in character from the other mountain ranges of South-Eastern Mongolia, being in many places covered with timber, abounding in water, and with its numerous ravines, rocky aspect, and steep, difficult paths, presenting a decidedly Alpine appearance. The loftiest peak attains a height of about 7400 feet. But the vegetation is poor compared with that of the Amur and Ussuri; the trees are chiefly birches, willows, and aspens of stunted growth; while the only shrubs form a sort of underwood in the forests, or else are met with in the dried-up beds of brooks.

The Inshan is important, zoologically considered, as forming a distinct boundary line for some kinds of mammals and birds. The commonest animals are the wolf, fox, a species of elk, the roebuck, and the antelope. The feline race is conspicuous by its absence, though native tradition speaks of the panther and tiger as former denizens of the country.

Bautu was the first town of importance after leaving the Inshan range. It lies about a verst north of the Hoang-Ho, and 50 versts from Chagan-Kurenj; it is built in a square shape, with earthen walls, and does a good trade with Mongolia. During their sojourn in the town, the travellers were subject to great impertinence from the Chinese, whose curiosity knew no bounds. The behaviour of the Mongolians was, on the other hand, of a friendly and sociable character. Here the river Hoang-Ho was crossed in ricketty boats, just as Messrs. Huc and Gabet describe in their travels. Continuing their journey along the banks of the stream for a distance of 434 versts as far as Dyn-chu (marked Chagan-Subarkhan on the maps), Prshevalsky and his companion arrived at the conclusion that the great Yellow River had recently materially altered its course, and that it is thus of course wrongly shown on the maps. This (as all our information respecting the stream proves) is a process which has been going on for ages, and now the river actually flows 50 versts to the south of its ancient bed. Continual quarrels between the Ordos and Urots was one result of these great physical changes. A Commission from Peking was appointed to settle the disputes, and they decided that the Ordos country should, as of old, extend as far as the old bed of the stream, and at this day the existence of Ordos divisions of territory on both sides of the Yellow River attests the truth of this traditional history.

The southern bank of the Hoang-Ho and its adjoining lands are principally meadows well adapted for culture; the population was quite recently very dense, and large herds of horned cattle were reared there. But the irruption of the Tungans in 1869 caused the

* A Map of Mongolia and the Desert of Gobi in the June number of *Ocean Highways*, 1873, shows a portion of Captain Prshevalski's route.

inhabitants to flee, and the cattle have become in consequence as wild as the antelopes. Four of these semi-wild bulls fell victims to Prshevalski's Lancaster rifle; and he says he could scarcely credit the fact of the domestic ox having developed into the quick, nimble, and light-footed beast before him.

Parallel with the course of the Hoang-Ho, and at a distance of from 20 to 25 versts from the right bank, there stretches for about 350 versts up stream a strip of sandy waste called Kusuptchi extending as far as Alächan. This fine sand-drift by the action of the normal winds is blowing into long ridges into which man and horse sink knee deep. In this melancholy, silent region, so the Mongol story goes, two great warriors Gesser-Khan and Chinghis-Khan once fought, and many Chinese were slain. But at God's command arose a mighty west wind, which enshrouded the corpses in sand, and now nothing is heard throughout that dismal waste save a sound of cry and lamentation.

The height of the valley of the Hoang-Ho by Bautu (measured by boiling-point thermometer) was 3320 feet, and 27 versts westward of Dyn-chu it was 3458 feet. This gradient is too slight to account for the swiftness of the stream, which flows at the rate of about 300 feet a minute. Beyond the valley of the Hoang-Ho the Ordos country is now very sparsely populated. Footpaths are overgrown with weeds, and here and there a partially destroyed village meets the eye, all attesting the ruins effected by the Tungans.

In travelling through the Ordos country the heat experienced by the travellers (it being from July to September) was most oppressive. This summer heat comes very late in the year, for the last snow fell on the 3rd of June; but, accompanied as it is by plentiful rainfall, it ripens the corn with such marvellous quickness, that it is usually cut by the end of July.

Crossing the Hoang-Ho for the second time, close by the town of Dyn-chu, the desolate land of Alächan was reached, some parts of which possesses a peculiar vegetation, the chief examples of which are the *Sak*, a tree about 10 or 12 feet high, with soft, hanging branches destitute of leaves, which afford forage for camels, while the stem is used for fuel; and the *Sulj-chir* grass, which blooms in August, the small seed-pods of which when bruised afford a species of meal, which, eaten with butter, is very good food. This *sulj-chir* is also met with in the Ordos country, and, according to Mongol report, in the desert of Gobi. Ravens, sparrows, larks, and swarms of *Syrrhaptes* (the Barguerlac of Marco Polo) frequent the Alächan country.

After twelve days' journey, Dyn-yuan-yin, the capital (height 4826 feet), was reached, a town which on their maps appeared as Wei-tchin-pu. For the first time for ten months Prshevalski and his companions received a hearty welcome. The Prince and his sons sent them constant presents of fruit, and a sugar-loaf which had come by way of Kiachta. They eagerly questioned the travellers about Europe, its people, telegraphs, railways, and other wonders; and were convinced that France and England could not but be dependent States of Russia.

About 20 versts distant from the town are the mountains of Alächan, which rise suddenly close to the margin of the Yellow River, but gradually diverge so that the axis of the range runs N.N.E. and S.S.W. and the southern end is 100 versts distant from the river. The barren waste of Alächan on the west, and the valley of the Hoang-Ho on the east, define sharply the limit of this mountain range. While on its northern face it widens out considerably, towards the southern extremity it narrows to a breadth of from 25 to 30 versts; the total length of the chain, according to the Mongol accounts, being about 240 or 250 versts. On the eastern side the range abuts abruptly on the plain in huge rocky walls, between 800 and 900 feet in height. The highest peak in the Southern Alächan is called Bayan-zumbur, and attains an altitude of 10,650 feet. The vegetation, which consists mainly of firs, pines, aspens and underwood, extends as far upward as 10,000 feet above sea level, and the animal life frequenting the woods embraces the elk, a species of horned sheep, and, according to native report, the sable; among birds, the long-eared pheasant, lammergeier, king vulture, magpie, and crow are common.

On the 15th of October, after a fortnight's sojourn in these mountains, and while still 600 versts from Kuku-Nor, Prshevalski and his party were forced to retrace their way to Dyn-yuan-yin and Peking. They had been unfortunate enough to have all their camels stolen from them north of Kuku-choto; and, in addition to this, they had lost eleven horses, so that their resources were drained in an unforeseen manner. Their return was by way of the Urot country north of the Hoang-Ho. This country is separated from the Mongolian plateau by a mountain range, without any distinguishing name, which extends parallel to the course of the Yellow River, at a distance of from 50 to 60 versts from it, and which does not run as shown in the maps, but is divided from both the Inshan and Alächan ranges by extensive plains from 100 to 200 versts in extent. This mountain range forms a remarkable line of demarcation between two distinct climates, that to the south being much the milder. Not a single Mongol was met with in these parts, for the Urot inhabitants had all fled before an invading band of Tungans from Amdo to the south of Kuku-Nor. But the Tungans are pitiful cowards in the presence of Europeans, four well-armed Russians sufficing to keep off nearly a hundred of these undisciplined rabble.

In the early part of June, 1872, Captain Prshevalski again set out from Dyn-yuan-yin, this time in company with a Chinese caravan, and after a month's travelling, reached the Pagoda of Chebsen, 60 versts north-east of the town of Sinin. Here the party were in the heart of the Tungan rebellion. Sinin was in the hands of the rebels, as well as some smaller places, while the surrounding country had been laid waste by their marauding excursions. A great battle had been fought, on the 6th of August, between them and the Chinese, but with an indecisive result. But in spite of all this the Russian party were quite safe, for their reputation, and that of their fire-arms, had spread far and wide, and had even caused the Captain himself to be looked upon as invulnerable.

On the 23rd of September, 1872, the party left Chebsen, and travelled by way of a mountain path between Tetun and Sinhuan, through the heart of the Tungan country towards Kuku Nor. A marauding

band of Tungans was encountered on the way, but these were completely overawed by the determined attitude of the Russians, who with their revolvers and carbines all ready, calmly proceeded on their way. The Tungans retreated, and no further opposition was offered as far as Kuku-Nor. This beautiful lake was reached on the 14th of October. It lies about 10,000 feet above sea level, is surrounded by fertile plains, frequented by numerous herds of antelopes, while snow-capped mountains lend a picturesque background to the view.

After crossing a lofty range, which rises south of the lake, and extends westward for about 600 versts, they entered upon a marshy country called Chaidam, at no very distant period the site of some large lake. This lowland is bounded on the south by the Burkhan-Buda Range, and westward is said to stretch away to Lob-Nor. It abounds in wild camels, but Prshevalski was too short of money to organize a hunting party to pursue them further. Through the middle of the Chaidam country flows the river Bayangol, about 400 versts long, and of tolerable breadth. The surrounding plains are about 1000 feet lower than the Kuku-Nor Lake, and are of course warmer. The fauna of Chaidam is poor, but ten new species of birds were discovered about Kuku-Nor.

On the 20th of November they reached the foot of the Burkhan-Buda chain, which abuts on the cold, sterile plateau of Northern Tibet, which to the south, as far as the Tanla Range, attains the height of from 14,000 to 15,000 feet. Above this lofty table-land tower two great mountain chains, the Shuga and Gurbu-Naidchi, the latter forming the commencement of the Kuen-Lun. Prshevalski travelled as far as 50 versts eastward, and after crossing the lowlands of Bayan-Khara-Ula, at last came upon the Upper Yang-tsze-kiang, or Murui-ussu, as it is here called, about 100 versts south of the Kuen-Lun.

Here, on the banks of the Blue River, about twenty-seven days' march from H'Lassa, Prshevalski, though loth, had to turn back. The storms, cold, and scarcity of fodder, had reduced his eleven camels to three, which had barely strength to put one foot before the other. Their money was exhausted, and even with it, it would have been impossible to have procured any beasts of burden, as Northern Tibet is almost uninhabited, from the Burkhan-Buda to the southern slope of the Tanla Range, a distance of 800 versts.

During their travels they had met many herds of yaks, gazelles, antelopes, and mountain sheep, and discovered a new kind of *mufflon*, which, from never having been hunted, was excessively tame. The yaks which Prshevalski shot were formidable creatures, and recall Marco Polo's description of the beast; one skin measured 14 feet from the nose to the tip of the tail. Their strength is very great, and their vitality extraordinary, considering that Prshevalski lodged eighteen bullets in one yak before it was killed, and three went into the head without, however, penetrating the brain, which in these animals is extremely small and surrounded with a thick casing of bone.

The high level of Tibet made breathing a difficult matter for the travellers, especially when in quick motion. There was, however, no trace of a deleterious coal-gas on the Burkhan-Buda, as Messrs. Huc and Gabet describe. Indeed, in several points, Prshevalski (in common, it may be observed, with other geographers) finds the worthy Abbé's accounts most unsatisfactory. For instance, Huc says nothing about the lofty mountains south of Kuku-Nor, which he must have passed close to, and he mentions, without further notice, the river Bayangol in Chaidam which is twenty times the size of the Bukhaingol, the difficulties of crossing which he enlarges upon. Many other instances are quoted by Prshevalski, which strengthen the notion that their accounts could not have been written on the spot.

Having passed the months of April and May in studying the flora and fauna of the Kansu Mountains, Prshevalski returned to Dyn-yuan-yin on the 15th of June, having collected more than a thousand species of birds, skins of forty large animals, and of more than a hundred smaller, and four large chests filled with botanical specimens. Observations for latitude had been made at the mouth of the Bukhaingol, on lake Kuku-Nor, at the foot of the northern slope of the Burkhan-Buda and on the Murui-ussu. His forthcoming map will embrace the whole extent of country between Lake Dalai-Nor and the upper Yang-tse-Kiang, as well as show his route survey from Dyn-yuan-yin to Urga.

Some details respecting the ethnology of the countries visited are given by Captain Prshevalski. He came across four races—pure Chinese and Dalds; a mixture of the Mongols and Chinese, in Kansu; pure Mongols in Kuku-Nor and Chaidam; and Tanguts, a very low race, in Kansu, Kuku-Nor, and Chaidam.

On this subject, the archimandrite Palladius remarks that the Tanguts are divided into two races, called yellow and black; the former live mainly in lowlands, and are gradually disappearing beneath Chinese encroachment; the black Tanguts are mountaineers, and live by pasture. The Muhammadans, who are to be found in Kansu, have chiefly come from Bokhara by way of Chama, Turfan, and Lutkchin. The Salar, a peculiar tribe of the Tangut race, are characterised by great fanaticism, and formed the nucleus of the Tungan rebellion, the Tungans themselves being mostly found in Kansu. Palladius remarks further that Prshevalski is the first European who has conveyed to us a correct notion of the structure of the Eastern Kuen Lun, and that his theory agrees exactly with that of Chinese geographers, who, it may be observed, deny the existence of any connection between the Eastern and Western Kuen-Lun.

In conclusion, it should be mentioned that the Russian Geographical Society have published a Chinese itinerary* from Urga to H'Lassa, compiled by the members of an ecclesiastical mission despatched to the grand Lama of Tibet for the purpose of procuring his sanction to the election of a Buddhist *Kutuchta* or priest of Urga. The mission after having been put off from year to year on account of the disturbances in Kansu and southern Mongolia, finally started on the 24th of March, 1873, and the details have been collected by M. Shishmaref, Russian Consul at Urga. The itinerary goes by way of Alächan and Kuku-Nor, in part coincides fairly with Huc's, and admits of being incorporated into our maps.

* Reproduced in *Petermann's Mittheilungen*, No. II. of 1874.

THE HYDROGRAPHICAL DEPARTMENT OF THE ADMIRALTY.

As changes have lately taken place in the Hydrographical Department of the Admiralty by the retirement of Rear-Admiral George H. Richards, C.B., F.R.S., from the onerous duties of Hydrographer, and the appointment of Captain Frederick J. Evans, C.B., F.R.S., to succeed him, we propose to give a brief history of this important branch of our naval service, and, it may be added, of the naval services, both imperial and mercantile, of every maritime country in the world; and also to add a sketch of the labours of the department.

By an order in council dated the 12th of August, 1795, the great inconvenience constantly felt by the officers of the fleet, "especially when ordered abroad, from the want of sufficient information respecting the navigation of those parts of the world to which their services may be directed, and with which they are sometimes totally unacquainted," led to the consideration of the means most advisable for preventing the difficulties and dangers to which His Majesty's ships were exposed from any defect on this head. For the purpose of taking charge of such plans and charts as belonged to the Government, and for selecting and compiling information, it was proposed that a proper person should be fixed upon to be Hydrographer to the Board of Admiralty, and—mark the item—the additional expense to the crown was not to exceed 470*l.* per annum.

The first hydrographer was appointed the same year in the person of Alexander Dalrymple, a gentleman then holding an appointment of the same nature under the East India Company. An assistant was also appointed, and shortly after, the Messrs. Walker, the well-known map engravers, became connected with the department, and preserved that connection until within the last few years.

Surveyors existed before the time that a hydrographer was appointed to direct them; and the surveys of the immortal *Cook*, and those of *Lane* and *Gould*, *Des Barres* and *Holland*, of the shores of the East Coast of North America and our British possessions of Newfoundland and the present dominions of Canada, testify to the present day the natural abilities and the scientific acquirements of our earlier surveyors. To these must be added *Vancouver* in North-West America, and *Hurd* in the "vexed Berrmuthas." These were all "Admiralty" surveyors.

Previous also to the appointment of Mr. Dalrymple as hydrographer, a survey of the Orkney Islands had been commenced by Professor Mackenzie, in 1750. He was then in no way connected with the Admiralty, but he was afterwards employed by that Board in the survey of the Shetland Islands. The Professor was succeeded by his nephew, Lieutenant Mackenzie of the Royal Navy, who continued the survey and extended it to parts of England and Ireland as well as Scotland.

At that period surveying, as a science, was not well understood; the instruments then in use were rude in comparison with those of the present day, and the observers may be considered to have been as rude as their instruments; and as those who directed their labours were entirely ignorant of the nature of the work, they were satisfied with quantity without due regard to quality. Consequently the surveys were imperfect, carried out as they were in a loose and hurried manner. Still, if due consideration be given to all the circumstances, the wonder is how they were done at all.

The mantle of Lieutenant Mackenzie descended on a relative who had served some time with him as an assistant. Mr. Graeme Spence was a civilian, but a vessel, commanded by an officer of the Royal Navy, was furnished him to carry on his survey. Mr. Spence,* and we may say Mrs. Spence, executed some of the best of our old surveys. They extended along the south coast of England and Scilly Islands, the Downs, and entrance to the Thames. Strange to say, that although Mr. Spence continued surveying for the Admiralty for nine years after the Hydrographical Department was constituted, it does not appear that he was ever directly connected with it. On his retirement, in 1804, the Trinity House awarded him 50*l.* a year in consideration of the services he had rendered to the navigation of the river Thames, by the discovery and survey of several new channels at the entrance.

The connection between the Admiralty and its surveyors was at this time ill-defined. They were employed by the Admiralty, but were not naval officers. They were bound to deposit their original surveys at the Admiralty, and yet were permitted to publish for their own special benefit. They even disposed of the copyright of their works to private publishers, which were afterwards re-purchased when the Admiralty decided to publish their own charts for the navy.

Mr. Dalrymple had been ten years in his position of hydrographer, and yet the principal object for which the appointment was made, viz., the efficient supply of charts to the Royal Navy, had in no way advanced. It was not that Mr. Dalrymple had been idle in his department, for he was a man of undoubted ability and vigorous intellect, and, as a Fellow of the Royal Society, he ranked high among the scientific men of his day. Indeed he was offered the charge of the expedition to observe the transit of Venus in 1768, afterwards entrusted to Captain Cook; but as he found he could not be allowed to assume the rank and command of a naval officer, he declined the appointment.

Mr. Dalrymple conceived that he would be best fulfilling his duty by compiling and engraving, without commencing any regular supply to the navy, with the idea of first completing sufficient for all purposes of navigation; thus the "steed was starving while the corn was growing." This delay produced impatience in their Lordships, and also an order to the hydrographer to supply charts to the navy from his own department, supplemented by purchases from private firms. This order caused the hydrographer to appeal to the Board for the appointment of a committee of officers to consider how their Lordships' orders could be best carried out, and a committee, consisting of Captains Sir Home Popham, Columbine, and Hurd, was nominated for the purpose. One of the results of this step was, that Captain Hurd succeeded Mr. Dalrymple as hydrographer. Mr. Dalrymple was called upon to resign by Lord Mulgrave. He declined

* Mrs. Spence greatly assisted her husband in his surveys, as she was an admirable draughtswoman.

to do so, and was summarily dismissed on May 28th, 1808. On the 31st, he published *The Case of A. Dalrymple*, bitterly complaining of the treatment he had received. It broke the old man's heart, and he died on the 19th of the following June.

Previous to the dismissal of Mr. Dalrymple, Captain Horsburgh, who had been employed for thirty years in India, offered the MS. of his East India Directory, with charts to accompany it, to the Admiralty, and also to the East India Company, on condition that they should be published for the benefit of navigation. But such was the short-sightedness of both departments that, after inspection, the offer was rejected on the plea that the work was too voluminous for them to undertake. The Directory was afterwards published by the worthy Captain himself, and with what success is well known.

Captain Hurd succeeded to the post of hydrographer in 1808, and on his accession some additions were made to the staff. It being war time, the energies of all were severely taxed; the draughtsmen worked early and late, Sundays as well as week days; manuscript charts had to be prepared for various expeditions, at short notice, and lithography was not at hand to aid them. From this time charts were regularly issued to the navy, arranged to the requirements of the station each ship was on. These were either published by the Admiralty or purchased, but the efforts of the hydrographer were directed to rendering the Admiralty independent of supplies from without.

A large addition was made to the stock of Admiralty engraved plates by the sale of the private collection belonging to Mr. Dalrymple, by auction. They had previously been offered for sale to the East India Company and Admiralty, but declined. They were now secured to the Admiralty, through the exertions of Mr. Walker, to the number of 130.

In the year 1810 the Admiralty had no surveyors employed. The only one who for some time had been so employed, Captain Flinders, was confined in a French prison at Mauritius. It was at this time that the Admiralty first conceded to the hydrographer the privilege of selecting a surveyor, which was followed by the selection of others, and from that period the hydrographer has continued to nominate all surveying officers. The union of the surveying service with the Hydrographical Department, with the hydrographer as practical head of both, may then be considered to have been accomplished. Mr. George Thomas, a master, was appointed for home surveying, and shortly after, Commander Francis Beaufort was sent to the Mediterranean to examine the coast of Karamania. Lieutenant William H. Smyth was also sent to the Mediterranean for surveying duties, but he was ordered to "make bricks without straw," for no vessel was provided, to enable him to carry out his duties. Fortunately, he became attached to the Sicilian flotilla, commanded by Sir Robert Hall, who furnished him with means to prosecute his labours. In 1813 Messrs. Lockwood and de Mayne, masters in the navy, were added to the surveying service, and employed in the West Indies and on the American coasts.

At the close of the war, in 1815, further additions were made to the surveying service, and men, whose names are now as "familiar as household words," began to appear in connection with it. Such were Hewett, Martin White, Owen, Bayfield, Madge, Vidal, and others.

Captain Hurd died in 1823. To him we are indebted for the establishment of an acknowledged surveying service, composed exclusively of naval officers; and although it was then in a crude state, it was the commencement of what we now find to be of so much importance, viz., the systematic education of young officers, who in succession would command surveys; for without this system the charts produced would naturally greatly diverge and differ from each other.

For some years after the conclusion of peace in 1815, the Government was extremely anxious to prevent foreign powers, with whom we had been waging hostilities, from obtaining possession of the charts published, as the success of naval operations on coasts much depended on the correctness of the charts, and their use was confined as much as possible to His Majesty's ships. But before Captain Hurd died the restriction was removed, and the use of charts, so jealously guarded, was thrown open to the mercantile or any other navy.

At the time of Captain Hurd's death the whole control of the department had drifted entirely into the hands of the well-known Secretary of the Admiralty, John Wilson Croker; and it is very certain that that potentate held the department in no very great esteem, for although there were naval officers fully competent to fill the post of hydrographer, none was appointed for more than two years. During this time it was left to the charge of Mr. Walker, who, although a most efficient man, was not in a position to secure efficiency. The department, from the neglect of the higher authorities, retrograded to a low ebb, and the officers who at the time were preparing their surveys for publication, suddenly got their dismissal; and their surveys, collected and drawn at a great expense to the country, were shelved on the plea of economy.

In 1825 Sir Edward Parry, who had distinguished himself in his North Polar voyages, was appointed hydrographer, and he succeeded in getting two lieutenants, Becher and Sheringham, attached to his staff for the purpose of compiling nautical directions to accompany the charts. In 1827 Sir Edward Parry assumed the command of another North Polar expedition, and Mr. Walker was again left in charge. On the return of Sir Edward Parry he resumed his position as hydrographer. During his absence, the Duke of Clarence had become Lord High Admiral, and on the deplorable state of the department being represented to him, he took active measures by the appointment of draughtsmen, to prepare the shelved surveys for engraving; but on the retirement of His Royal Highness the same causes that proved so prejudicial to the department before, were again in operation, and, finding he could not conduct the duties with advantage to the country or credit to himself, Sir Edward resigned the appointment.

Captain Francis Beaufort succeeded Sir Edward Parry in 1828, and from his appointment may be dated the commencement proper of the department. This may be said without prejudice to his predecessors, inasmuch as opportunity was not afforded them to organize it. Captain Beaufort was not only a scholar but also a practical and scientific surveyor, and from his extended

experience he knew the requirements of the seaman and the navigator. He also knew that those requirements had not been met, and that the state of the charts was such that but little dependence could be placed on them, and he saw that if any radical improvement was to be made in charts in general, it would devolve on this country to carry those improvements into effect.

Captain Beaufort was truly a business man, punctual and assiduous to a degree. He possessed that rare power of discernment which enabled him to judge of men; and in his selection of officers to command surveys he generally succeeded in securing the services of those who carried out his views most zealously.

From being a mere adjunct of the Admiralty, in 1831 the office was formed into a separate department, framing its own estimates and, under the sanction of the Board, arranging its own work.

In 1854 Sir Francis Beaufort retired, having for nearly a quarter of a century laboured in the department he so worthily presided over, and so much was he esteemed, that those of the Surveying Service, and others who knew his worth and respected him, combined to do him honour by having his portrait painted and engraved, and also by establishing the Beaufort testimonial, which is now an object of ambition to attain by the junior officers of the navy, when passing their college examination in the higher branches of mathematics. The original portrait is appropriately placed, with those of many another gallant officer, in the Painted Hall at Greenwich.

During Captain Beaufort's administration, surveys were organized in the Mediterranean, and on the coasts of Africa, South America, Australia, New Zealand, and China; whilst the coast surveys of the United Kingdom were prosecuted with increased vigour; and, in addition to these, the various Arctic expeditions received their instructions prepared by his hand.

In Captain Washington the Board found a worthy successor to Sir Francis, a man full of energy and enthusiasm, of wide and enlightened views, of great perseverance and industry. Captain Washington had, since the commencement of the late war with Russia, been assisting the hydrographer, and thus had a previous knowledge of the working of the department, before he took the reins into his own hands. Captain Washington's energy was soon conspicuous in the number of charts published, the further prosecution of foreign surveys, and in his endeavours to complete the surveys of our own coasts. He also successfully directed his efforts to the greater circulation of the Admiralty charts among the mercantile marine of this country; and although it does not at first sight seem right on the part of Government to compete with private publishers in the sale of charts, it must be remembered that the said publishers obtained their data from the Admiralty charts, and as the latter are considered the best authority, in the interests of navigation and commerce, it is the duty of a government to sanction the promulgation of the best, as best insuring the safety of lives and property.

Captain Washington may be said to have fully sustained the high character of the department attained by his predecessor: he died a Rear-Admiral in 1863. On the abolition of the Indian Navy, in the year previous to Captain Washington's death, the valuable charts and documents collected by the East India Company were transferred to the Admiralty, and the duties connected therewith, hitherto performed by the Company's officers, were transferred to the Hydrographical Department of the Admiralty.

Admiral Washington's successor, Captain George Henry Richards, was, at the time of the Admiral's death, on his way home from a foreign survey, and on his arrival in England he at once assumed the post of hydrographer. It would be invidious to enter into details of his labours in the department; but he undoubtedly has done much to increase its efficiency, and also to raise the dignity of the department to what—as one of the most important branches connected with the Naval Service of this great maritime nation—it should be. He soon discovered that the staff was quite inadequate to cope with the increased and increasing requirements of the day; the number of charts and books had so multiplied, both requiring constant revision, that it was difficult to keep up the current work, and at the same time to produce more. On clearly stating the case, two additional naval assistants were allotted, which greatly relieved the strain on the department. By Captain Richards's exertions the whole department was placed on a better footing, and the transfer of the Harbour Board to the Board of Trade, which occurred before he took office, afforded more space, which was greatly needed; but even as it is, the want of room for the proper conservation and arrangement of the numerous and valuable—nay invaluable—documents connected with the department, is very great, and has more than once been the subject of comment in the House of Commons. That such a state of things should exist, is a disgrace to this great nation. At the Dépôt des Cartes, in Paris, a greater amount of space is allotted to the British charts alone than the English Admiralty affords for the charts of the whole world. Many proposals have been made to rectify this state of things, and even at times to remove the department from the Admiralty, but the necessity of constant reference precludes the latter being done; and not until a new Admiralty be built can the present inconvenience be remedied.

Captain Richards directed his attention to the production of physical charts, so greatly needed, and of such vital importance to the navigator. The mass of information awaiting this process was enormous, and the tedious task of digesting and summarizing it, and applying it when thus arranged, has been most successfully accomplished by Staff-Captain Evans and Staff-Commander T. Hull, two of the Naval Assistants. It is therefore not too much to say that the physical charts published by the Admiralty have given a greater impetus to the knowledge of the causes and effects of winds, currents, and temperatures than any publications that have preceded them. They have already been reproduced in France and other countries.

It would be impossible in an article such as this to do full justice to ten years of assiduous progress in this department, the more so as the officer who has so lately resigned the position of hydrographer is still with us. His unremitting attention and devotedness to his duties told on his health, and obliged him to resign the post he so worthily filled.

We now proceed to give a sketch of the constitution and working of the department, and of the present state of our surveys.

The Hydrographic Department of the Admiralty is composed chiefly of naval officers; and consists of the Hydrographer, seven naval assistants, who are borne on the books of one of Her Majesty's ships, one civil assistant employed on pilotage duties, a writer, a superintendent of compasses and assistant, a superintendent of charts, six draughtsmen, and four packers of charts and messengers—twenty-four individuals in all. The expenses of the department are provided for under Vote V., which comprises the Hydrographic Department at Whitehall, the surveying service afloat, the observatories at Greenwich and the Cape of Good Hope, the nautical almanac establishment, and other minor branches of the scientific service. The total grant for this branch, under Vote V., was 120,357*l.* in 1861-62, and only 107,790*l.* in 1873-74. The vote for Her Majesty's ships employed as surveying vessels was 72,860*l.* in 1861-62, and 62,678*l.* in 1873-74: a deplorable reduction of upwards of 10,000*l.*, which represents a proportionate decrease in efficiency, and in the amount of useful work done.

The surveys are carried on either by regular ships-of-war specially fitted for that purpose, or by small hired vessels; the latter method being adopted where practicable, with a view to economy. Of the former there are at present only four! On the home coast there is one small surveying steam vessel, the 'Porcupine,' under Staff Commander Parsons, with a hired crew. Thanks to the representations of Sir Bartle Frere, there are two surveying vessels on the East Coast of Africa, H.M.S. 'Shearwater,' commanded by Captain Wharton, and H.M.S. 'Nassau,' Lieutenant F. J. Gray (see *Ocean Highways* for February, 1874, p. 474). Lastly, there is H.M.S. 'Sylvia,' which vessel was paid off at Sheerness in April, 1873, and recommissioned in the following November, by Captain St. John, in order to resume the survey of Japan. The surveying ships are not, as was formerly the case, supplied with naturalists, and in all other respects an amount of economy is enforced, which impairs efficiency. If we look back for about ten years, a far more satisfactory state of things prevailed. In 1862 there were twelve of Her Majesty's vessels engaged upon surveying duties, instead of only four, as at present. The 'Seaflower,' 'Rose,' 'Bann,' 'Asp,' 'Seagull,' 'Woodlark,' and 'Porcupine' were at work on the coast of the British Isles. Captain Spratt had the 'Medina,' and Commander Mansell the 'Firefly,' in the Mediterranean. The 'Rifleman' and 'Swallow' were surveying in the China seas; and Captain Richards himself was at work off Vancouver's Island in H.M.S. 'Hecate.'

At present, besides ships-of-war, there are eight hired vessels or boats' parties employed on surveying work. In Australia, Staff Commander Stanley, with a colonial steamer and hired crew, is surveying the coast of Victoria, and Staff Commanders Bedwell and Howard, with hired schooners and crews, those of Queensland and South Australia. Navigating Lieutenant Archdeacon, with a hired boat's crew, is performing similar service on the coast of West Australia. The Australian Colonies in one instance provide a vessel, and in others pay a share of the expenses of the surveys. Lieutenant Llewellyn Dawson is borne on the books of the Commodore's ship, for doing surveying work in New Guinea. In the West Indies, Staff Commander Stanley is at work, with a hired schooner and crew, and Navigating Lieutenant Maxwell is surveying the Newfoundland coast, also in a hired schooner. Staff Commander Kerr is surveying with a hired steamer and crew on the west coast of England, and Staff Commanders Hall and Ray in a steam launch at Portsmouth.

The number of all grades of naval officers, employed on surveying duties afloat, is two captains, one commander, seven lieutenants, twelve staff-commanders, fourteen navigating lieutenants, and twelve sub-lieutenants: total forty-eight.

The most important duties of the Hydrographic Department are to execute accurate surveys of all parts of the world which are visited by British ships, to prepare and publish these surveys in the form of charts, to write and publish nautical directions to accompany the charts, to prepare annual tide tables and light lists for all parts of the world, to take charge of remark books from the captains of Her Majesty's ships, to collect, compile, and promptly publish all hydrographic notices and warnings of dangers, and to keep the charts and other nautical documents corrected up to the latest dates. It is also the duty of the department to supply Her Majesty's ships with charts, chronometers, and nautical almanacs, and to see that there are always sufficient charts and nautical works to meet the public demand. Some idea may be formed of the extent of this demand when it is stated that, on an average, there are 100,000 copies of Admiralty charts sold annually to the general public and to foreign governments, exclusive of the supply to the Royal Navy; and that about 21,000 copies of the nautical almanac are sold annually. Then there are 450 chart boxes, each containing on an average from 300 to 400 charts in constant circulation for the navy; and 1000 chronometers are constantly in circulation between the Royal Observatory and Her Majesty's ships. It is worthy of remark, that all foreign navies navigate by our charts, and all our sailing directions are immediately translated, especially by the French authorities.

Not the least important of the functions of the Hydrographic Department is its responsibility for all matters connected with the compasses of Her Majesty's ships; each individual ship of modern construction having to be visited, special observations made, and the compasses adjusted by magnets, both on her first equipment and at subsequent periods.

The preparation of charts is under the superintendent, whose duties are of a very important and responsible character. They are at present ably performed by Staff Commander T. A. Hull, who is an experienced practical surveyor, as well as a good draughtsman. The copper-plate engravings of the charts were for a long series of years executed by one firm—Messrs. Walker, of Castle Street, Holborn—who also engraved the sheets of the Atlas of India. Since they retired the work has been distributed among three firms. The copper-plates are deposited in the vaults of the Admiralty, at Whitehall, which at present contain 2700 plates, at an estimated value of 170,000*l.* About sixty are added to the stock annually, but of course many of the old plates are superseded in consequence, and are laid by as obsolete. The printing of the charts is entrusted to one firm, Messrs. Malby and Son. There are constant additions and corrections being made in the charts, and a certain number of copies of each, varying

from six to twelve, are for this purpose constantly on the shelves of the Hydrographic Department. As there are 2500 different Admiralty charts in circulation, the number collected at one time on the shelves may amount to as many as 30,000. A large number of the plates, which are most generally in use, are permanently lodged at Messrs. Malby's establishment, in a fire-proof receptacle.

For the circulation of the charts the Admiralty employ one sole agent, Mr. J. D. Potter (Poultry, E.C.), who agrees to circulate them as widely as possible for the benefit of navigation, at the prices attached to each. For this purpose he employs sub-agents at all the principal ports, at home and in the colonies. From the sales by the agent, the Treasury receives about 6000*l.* a year, so that this branch of the department may be truly considered as self-supporting, or nearly so. In 1873-74 the cost of engraving, printing, and mounting charts was 11,000*l.*

It is evident that the work of the Hydrographic Department, on shore and afloat, is practically the most useful and important upon which the Navy can be employed in times of peace. Sir Bartle Frere, in his admirable letter to Mr. Gladstone on the subject of the Arctic Expedition, only expressed the feeling of every seaman, when he protested against the insinuation that voyages of survey and discovery were not strictly "professional naval services." "There are few better naval schools than a surveying or discovery ship," he truly added, "and if such ships were multiplied, not only would commerce benefit, but men-of-war would be better supplied with practical seamen than is possible at present. This is more especially the case with regard to any Arctic voyage of discovery. Service in the Arctic seas is one of the best possible schools for seamen, and is one of the few schools which now remain, by which a thorough seaman can be formed quite equal to the best men of former days." The despatch of voyages of discovery, especially for the prosecution of Arctic exploration, and an increase in the number and efficiency of surveying ships are measures which should no longer be neglected or postponed. There is at length a well-grounded expectation that an Arctic Expedition will be despatched next year; and Admiral Richards, by his zealous and indefatigable exertions to improve every branch of his department, has prepared the way for a better order of things in other respects. One great want is the appointment of skilled naturalists to ships employed on distant and little-known coasts, such as the East Coast of Africa and Japan. Another is the provision of better and more completely equipped vessels. There is much room for improvement; great need that our rulers should more fully appreciate the importance of an efficient administration of the surveying branch of the service; and we earnestly trust that the days of false economy and of gross neglect of enterprises of discovery and survey are numbered.

Much of the information in this article is derived from a valuable Memoir on the Hydrographical Department of the Admiralty, which was drawn up by Admiral Richards in 1868.

THE ISLAND OF HORMÚZ (ORMUZ).

WHEN visiting the once celebrated island of Hormúz last March, I was informed by some natives that the heavy rain which had then just fallen had exposed to view some inscriptions, by washing away the soil with which they had been covered.

On proceeding to the spot with them, I found two flat horizontal stones about 5 feet by 3 in size, with the inscriptions in Portuguese of which copies are attached, and which appear to be only ordinary mortuary records. They are of date 1591 and 1603, and are the only inscriptions I have ever been able to find on the island. The position of the stones is indicated on the plan.

As I do not believe there exists any detailed description of the present state of the island, and of the remains of its ancient grandeur, a brief sketch of them may be of interest, and a glance at the history of its rise and fall is also added. Its very name has a charm, which the place itself little deserves, and is probably due to its mention by some of our great poets. I doubt whether its reputation for magnificence was altogether deserved,* certainly not so according to the ideas of the present day. How strange the power of genius, which by a single line† can thus immortalize an obscure settlement on a barren isle, and render it a synonym almost for barbaric magnificence.

The appended view of the Portuguese fort and point gives a sufficient idea of its present appearance from the anchorage, and the plan, from a survey made by myself, shows the approximate extent of the ancient cities and modern village, with a careful ground plan of the fort.

The island, which is rather more than four geographical miles across, and roughly circular in shape, presents a mass of hills, from 300 to 700 feet in height, occupying a space of about 3 miles each way on the south and south-west sides, the shores of which part are quite precipitous, the north and east sides presenting a low plain. Its surface is therefore pretty equally divided between hills and plain.

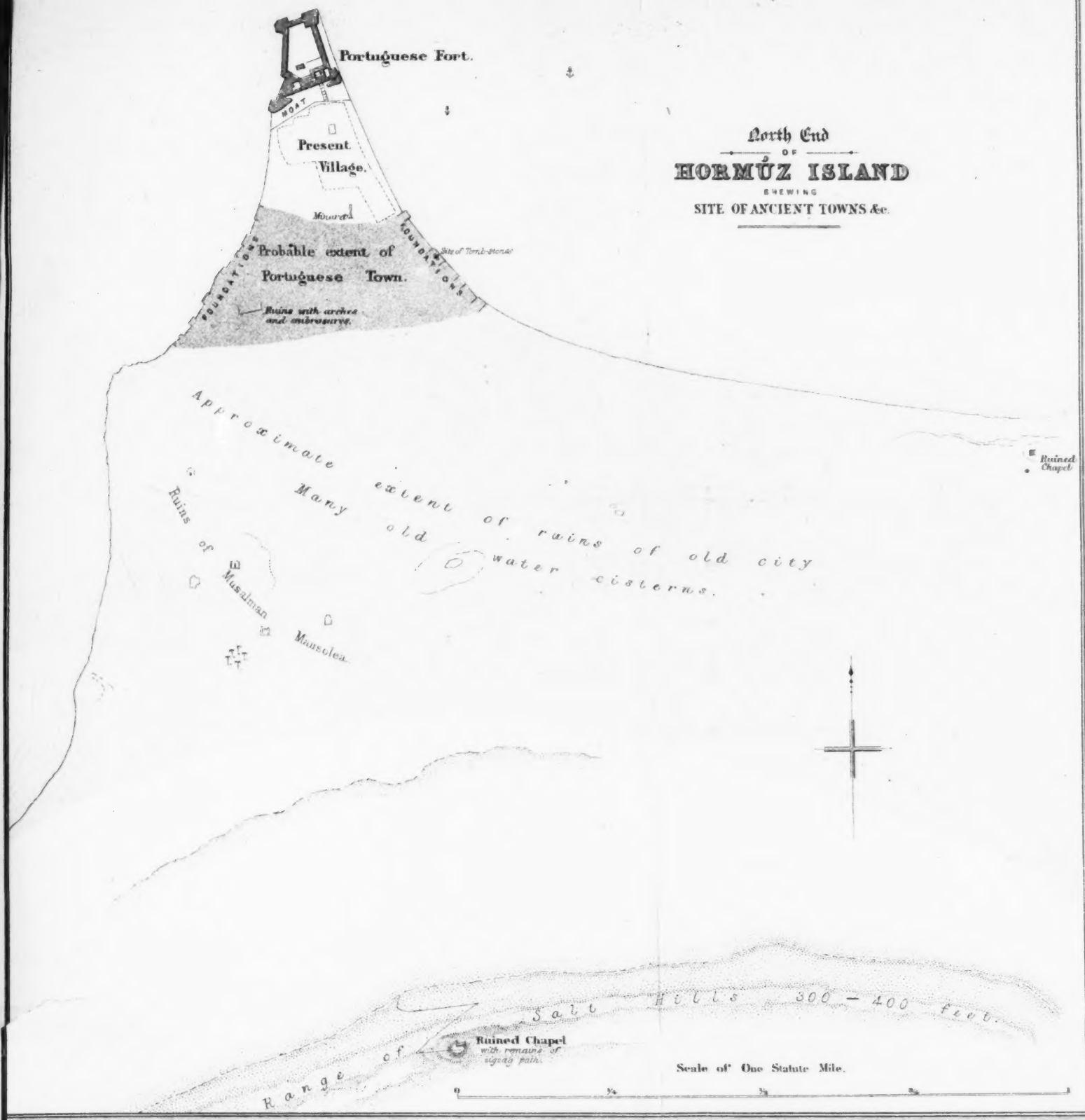
The hills are of somewhat remarkable geological character. There are some stratified rocks, forming the cliffs at the south-east angle, but the whole of the rest are probably of volcanic origin, and consist chiefly of rock-salt, which is raised to a height of 300 to 400 feet, and presents the most fantastic outline conceivable owing to the dissolution of the salt. They are incrusted with bright-coloured earths, red, purple, and yellow, and are almost impassable, owing to the exceeding ruggedness of the surface.

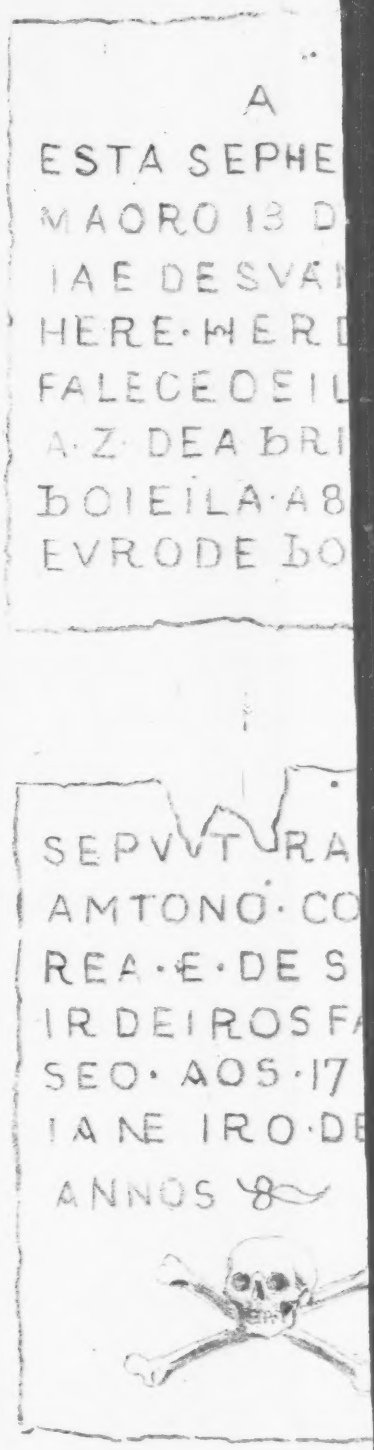
With these salt hills are associated several peaks of white or light grey-coloured rock of trachytic character, the highest of which rises to 700 feet, and all are of sharp, precipitous outline. A view from the top of the high peak presented a perfect wilderness of pointed and rugged ridges, separated by abrupt valleys and singular funnel-shaped holes of various sizes, some of very large dimensions, possibly 200 feet in depth, and others only a few feet deep, but all at a very steep slope. The trachytic rock is studded with iron pyrites and other minerals, often in most beautifully developed crystals.

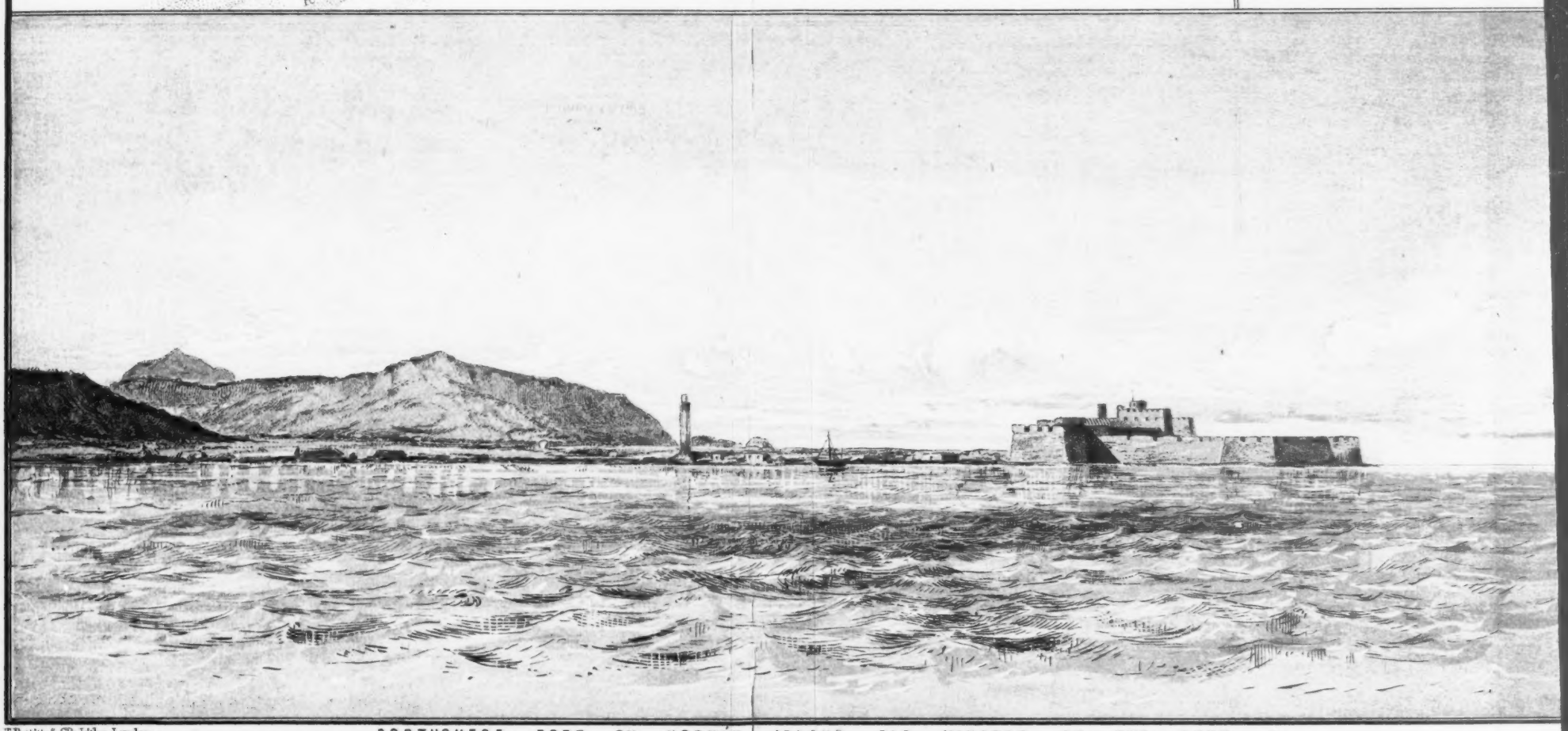
* See also J. B. Fraser's narrative on this subject.

† Or rather a single word in a line—

"High on a throne of royal state, which far
Outshone the wealth of Ormus and of Ind."—*Milton.*







T.Pettitt. & Cº. Litho, London.

PORTUGUESE FORT ON HORMÚZ ISLAND, — OLD MINARET ON THE LEFT.

North End
OF
RMÚZ ISLAND
SHEWING
TE OF ANCIENT TOWNS &c.

Ruined Chapel

d city

s 300 — 400 feet.

of One Statute Mile.

A
ESTA SEPHEDESI
MAORO 13 DEFAR
IAE DESVAMOL
HERE·WERDROS
FALECEOEILEA
A·Z·DEA bRILDE
bOIEILA·A8DEE
EVRODE bO3
SEPVLTVRA·DE
AMTONO·CO
REA·E·DE SEVS
IRDEIROSFALE
SEO·AOS·17 DE
IANEIRO·DE·159
ANNOS 8

COAST OF PERSIA

Mausolea of Europeans.

Dutch factory

BANDAR 'ABBAS
called Gombroon by early voyagers.

Portuguese Fort.

Minaret

SITE OF CITY

HORMÚZ

Ruins of Biruu-bagh

PART OF JAZIRAT AT-TAWILAH

Portuguese Fort.

TOWN OF HESM.

Map
shewing the position of
HORMÚZ ISLAND,
with reference to the
PERSIAN COAST,
AND THE OTHER
OLD EUROPEAN SETTLEMENTS
IN THE VICINITY.

From actual Survey
by A.W. Stiffe, late Lieut. R.N.

Scale of Statute Miles.
0 1 2 3 4 5

Unfinished old Dutch Fort

Part of Larak Is.

ND. — OLD MINARET ON THE LEFT.

COAST Gombroon of PERSIA

Isl^d of HARMÛZ or ORMUS.

Fortress

Landing Place

Parade

Alkoran

St John

St Charles

Isl^d Kishma

whence Ormûs has its Water.

Lardimira

St^a Ca Pena!

St Lucia

King's Palace

Turumbake

Entrance for Ships

BIRD'S-EYE VIEW OF HORMÚZ FROM "ASTLEY'S" COLLECTION.

The valleys or ravines opening out of this mass of hills, and carrying off the rain-water which is not absorbed in the funnel-shaped pits, have in their course through the plain all the appearance of frozen rivers winding down to the sea. I walked about a mile up one on the salt incrustation, and the illusion was perfect, except as regards the temperature. This salt incrustation is collected and exported to Bandar 'Abbasi and Maskat.

The plain on the north side terminates in a low, sandy point, on which stands the old Portuguese fort, and near it is the modern village, consisting chiefly of mat huts, and containing possibly 200 men, who have a few boats, and export salt fish, salt, and a red earth, called by them *gairu*, which is used for staining and seasoning wood, and is sent to Maskat, and thence to Calcutta. A few soldiers or armed men hold the old fort as a sort of military post for the Governor of Bandar 'Abbasi. The place is rarely visited by a European vessel.

The fort is a quadrilateral bastioned fort, about 750 feet long by 620 feet broad. It has casemates under the ramparts, and the two southern or landward bastions are built with orillons. The entrance gate is in one of these recesses, and leads successively into two small courtyards, before giving admission to the body of the place. In the *enceinte* is a fine large underground water cistern, with a groined roof, supported by rows of pillars. The south-west bastion and west face are much undermined by the sea, and partly ruinous. Many of the arches and vaults inside the fort have been blocked up with stone to prevent their falling. It was separated from the island by a moat, now filled up; the remains of a bridge across the moat are visible. Many rusty, old iron guns lie about the interior of the fortress. The mortar used was excellent, and much more durable than the stones. The only other remains of the Portuguese town are the foundations of buildings along the sea shore, and the ruins of a sort of outwork, on the landward face of the town, which has embrasures, and has been defended by a moat. The space occupied by the town is about half a mile by a quarter of a mile, as far as can be judged by the appearance of the ground, and from the appearance of the old map attached.

Of the Arab city, the most important ruin is a minaret, about 70 feet high. It is of brick, and has been coated with glazed tiles, in the manner which renders the mosques of Baghdad such striking objects. It has two spiral staircases inside, much broken at the foot, and the whole structure is in a tottering state; the lower courses of bricks, to a height of 6 or 8 feet, being much weathered away, thus undermining the building.

Of the rest of the city nothing remains except mounds strewn with broken pottery, and a vast number of water cisterns, mostly choked with earth, in many of which small crops of vegetables are now raised. At about half a mile to three quarters of a mile to southward of the minaret are a number of Arab tombs of some pretensions to architecture, some of which have been of two stories. They are all more or less ruinous.

In addition to the ruins of the Portuguese town already mentioned, there are the remains of a chapel, with a zigzag road up to it, on a peak of the nearest range of salt hills; also of a small chapel or hermitage on a little hillock on the north-east coast. The quaint little map or picture attached, which is copied from Astley's collection, gives a kind of bird's-eye view of the island and adjacent coast, with ships arriving and leaving, and conveys some notion of the extent of the town. The plain outside the town is much foreshortened, for I believe, from the ruins visible, the town only extended as far as the space shaded on my plan. The two chapels referred to above are shown on it, and have names given to them. The town appears to have contained two churches, and not to have been regularly fortified on the land side. The position of the minaret, if the old sketch be correct, limits the extension of the town northward. The Portuguese are said to have destroyed the mosque belonging to the minaret, as being too near the castle. The plan is probably of a date between 1612 and 1620.

One other ruin of the Arab city remains to be mentioned, viz., the king's palace or Túrun-bágh, on the south-east corner. This is described as the "fairest of all—there, upon a plain between the hills and the sea, you see a country seat of the old kings of Ormuz, adorned with groves of palm trees and two large cisterns for water." The ruins of buildings and of water channels for irrigation are to be seen here, which is the only point on the hilly part of the island where stratified rocks are found, and which is free from the all-pervading salt deposits.

The general plan, taken from the Persian Gulf chart, shows the situation of the island with reference to the surrounding land. The Portuguese fort in Kesm town is in fair preservation. An old writer not inaptly sums up the appearance of the island thus:—"Formerly this island was on fire, which left it so uncouth, that it is amazing to those who behold it."

History.

The earliest settlement of the island, which had previously been uninhabited, was made about 1301 A.D. or 700 A.H. An account of it was written by Túrun Sháh,* the king of the island in 1347-78. Before the above date, the kingdom of Hormúz was on the mainland, and this history says it was founded by Arabs, who crossed over from Arabia, but gives no date. This is highly probable, as nearly all the cities on the Persian coast have been thus founded. The site of this city on the mainland has been conjectured to be on the Mináb River. It possibly succeeded an older settlement of the same name, for Arrian tells us Nearchus found a town called Harmozia at the mouth of the river Anamis, in a fertile district. The island was then called Gerun (variously spelt), and the name Hormúz only applied to the kingdom and city on the main.

The history says the twelfth king of Hormúz reigned thirty-five years, and died A.H. 676 (1278), which is the first date given, and would not put the foundation of the settlement on the main earlier than, probably, the end of the 11th or middle of the 12th century. It then appears that during the reign of Mir Bahdin

* The History of Persia, to which is added an abridgment of the Lives of the Kings of Ormus. The Persian History, written in Arabic, by Mirkond, that of Ormus, by Torunxa (*sic*); translated into Spanish by Antony Texeira, and now into English by Captain John Stevens, London, 1715.

Ayaz Seyfin, fifteenth king of Hormúz, A.H. 700 (1301), swarms of Turks, or more correctly Tartars, under the descendants of Jengis Khan, "broke into the kingdom of Kermon (Karmán), and from thence to that of Ormuz. The wealth they there found tempted them to come so often that the inhabitants, no longer able to bear that oppression, left the mainland, and went to the island Broct, by the Portuguese called Quixome" (now called Jeziret at Tawflah, or after the name of the town on it, Kesm). After some days Ayaz went about that part of the gulf seeking some convenient island where he might settle with his people. He came to the then desert island of Gerun, and resolved to beg this island of the king of Keys (Kais), to whom it belonged, as did all the others in the Gulf of Persia. The island of Kais, at that time a kingdom, has still the ruins of a considerable city on its north side, and formerly had all the trade that afterwards was removed to Hormúz. Having obtained of "Neyn, king of Keys," the island of Gerun, Ayaz and his people went to live there, and in remembrance of their native country they gave it the name of Hormúz. Ayaz was the fifteenth king of Old Hormúz, and the first king of New Hormúz. Then follows a period of wars with the kings of Kais and Bahrein, resulting in the maritime supremacy of Hormúz; about 1320, Kodbadin, the fourth king, took Kais and subdued Bahrein.

In the history by the Abbé T. G. F. Raynal, translated by J. Justamond, the following graphic but somewhat high-flown description of the Arab town is given:—"Hormúz became the capital of an empire which comprehended a considerable part of Arabia on one side, and Persia on the other. At the time of the arrival of the foreign merchants, it afforded a more splendid and agreeable scene than any city in the East. Persons from all parts of the globe exchanged their commodities and transacted their business with an air of politeness and attention, which are seldom seen in other places of trade. The streets were covered with mats and in some places with carpet, and the linen awnings which were suspended from the tops of the houses, prevented any inconvenience from the heat of the sun. Indian cabinets ornamented with gilded vases, or china filled with flowering shrubs or aromatic plants adorned their apartments. Camels laden with water were stationed in the public squares. Persian wines, perfumes, and all the delicacies of the table were furnished in the greatest abundance, and they had the music of the East in its highest perfection." The beauty of the women is expatiated on rather warmly for an Abbé, and he winds up thus:—"In short, universal opulence, an extensive commerce, politeness in the men and gallantry in the women, united all their attractions to make this city the seat of pleasure."

But the time was at hand for a new power to appear on the scene: the Portuguese, at that time the first of European maritime nations. In March, 1506, sailed from Lisbon Alonzo d'Albuquerque and Tristan d'Acunha, with 13 ships and 1300 men—small means to undertake such extensive conquests. We have only to follow the former, who was to cruise on the coast of Arabia. Having subdued the island of Socotra, and built a fort on it, the fleet separated, some of the ships going to India; but Albuquerque, with 7 ships and 460 men, took and plundered all the towns on the coast of Arabia, viz., Calayatte (Karyat?) Mascate (Maskat), Soar (Sohar), and Orfuzam (Khorfakán?), and thence sailed to Hormúz, then first seen by Europeans, and whose wealth and splendour had attracted the cupidity of the Portuguese Government. The ruins of Maskat, it is recorded, were given up to the inhabitants, on the proviso that they should pay to the king of Portugal the same tribute they had paid to the sovereign of Hormúz.

Albuquerque found Hormúz defended by 30,000 men, but boldly summoned the king to become a tributary of the Portuguese crown. The king returned answer that the kings of Hormúz were not used to pay, but to receive, tribute from foreigners, &c. Albuquerque commenced an attack by sinking and burning the fleet in the roads, when King Seyfadin, being sensible that the city would share the fate of the fleet, submitted, and agreed to pay 15,000 xeraphines annual tribute, and that Albuquerque should have liberty to build a fort, for which he was to be supplied with money and necessaries. The fort was at once commenced; but the discontent of the "gentlemen volunteers" at the suspension of their profitable plundering expedition, resulting at last in open mutiny, necessitated his abandoning the work for the time.

However, when Albuquerque was appointed Viceroy of the Indies in 1515 (date not quite certain), an armament of 27 ships and 1500 men was fitted out at Goa, and the viceroy compelled the King Toro (*sic*) to allow him to finish and arm the fort, furnishing materials for the same, also to swear an oath of fidelity; while the city was to be disarmed by the removal of the cannons into the Portuguese fort. Certain hostages also, persons of the royal family, were sent to Goa. As the king's favourite minister, Hamades (probably Ahmad), appeared inclined to thwart the Portuguese, Albuquerque had him put to death; the fleet then returned to Goa.

The conquerors now began to oppress the people, and in 1521 Siqueira appointed Portuguese collectors of customs at Hormúz, which seems to have been the last straw. An extensive conspiracy was formed, which resulted the following year in a simultaneous insurrection by night at Hormúz, Karyat, Sohar, and Bahrein, which failed, although many of the Portuguese were killed; those only at Hormúz escaped who took refuge in the castle, which the inhabitants vainly endeavoured to take. After this failure King Toro retired with all his subjects to the island of Queixome (Kesm), and set fire to the Arab city of Hormúz, which burnt four days successively. Soon afterwards this king was murdered by one of his own confidants, and his son, Muhammad Shah, who succeeded him, made a new league with the Portuguese, paying an increased tribute, notwithstanding the decreased resources of the state.

In 1529, when Nuno da Cunha was appointed Governor-General of India, he visited the island, and redressed some of the private grievances of the oppressed people, but not abating the exorbitant tribute, which, in 1543, was raised to 100,000 ducats annually.

In 1552 the Turks fitted out an expedition at Basrah under one Pír Beg "a veteran pirate," which took Maskat; but failing in an attempt on the fort of Hormúz, they plundered the city, and returned to Basrah with a rich booty.

The succession of the kings, whose power soon became quite nominal, was preserved inviolable during the occupation of the Portuguese, but the new king could not be crowned without the permission of the Portuguese: he had also to take the oath of fidelity to the King of Portugal, and could not quit the island without the consent of the governor. The commerce and importance of the island commenced to decline from the Portuguese occupation, partly owing to the rapacity of the Portuguese, and doubtless also on account of the new channel for trade opened *viâ* the Cape of Good Hope; but it was sufficiently prosperous to excite the jealousy of Shah 'Abbas of Persia, in the beginning of the 17th century, who at length wrested it from them.

It appears that the Portuguese when in the height of their power allowed no ships to navigate those seas without a pass from the captain of one of their forts, and only under oppressive conditions.

In 1620 or 1621 the Portuguese built a fort on Queixome (*sic*), but it was soon besieged, and taken in February, 1622, by Shah 'Abbas, with the assistance of the English, on which occasion fell William Baffin, pilot, the distinguished Arctic voyager.

We now see the first appearance of the English in the Gulf of Persia: the ships of the East India Company at this time appear to have been at open war with the Portuguese in the Indian seas, although the two countries were at peace in Europe. It must be admitted that the league with the Persians to "betray* Christianity, which the Dutch to their credit refused," seems at the present day a questionable proceeding. The consideration is represented to have been profit to the Company, in the shape, first of a share of the plunder, which it is a comfort to reflect they did not get; and secondly, half of the customs duties at Gomaron or Gombroon (Bandar 'Abbasi); but the following account of the closing scene at Hormúz, taken from a "relation of the war of Hormúz, and the taking of that place by the English and Persians in 1622," shows also more legitimate motives.

In justice to the Portuguese, with reference to the siege, it should be stated that the fort is said not to have been in a good state of repair, and the moat had been allowed to fill up with sand. Their governors were relieved every year, and "had but a slender knowledge of martial affairs. The governor at that time was an ancient man and not trained up in the wars, and not provided with experienced gunners"—results apparently of a strict seniority system; but for all that, their defence was desperate, as appears in the narrative, which is (somewhat abridged) to the following effect:—

At a consultation held in Swally Roads (Surat) a commission was given by the President and Council at Surat to Captains Blithe and Weddell, who were bound for Jasques (Jáshak)† with five good ships and four pinnaces. The ships were the 'London,' 'Jonas,' 'Whale,' 'Dolphin,' and 'Lion.' They were to sail for Jasques at once, keeping together for mutual defence; and as the Portuguese had disturbed the trade, and made sundry assaults upon our ships, they were authorized to capture any vessels flying the Portuguese flag, and make sundry reprisals on other ships. As the enemy, under Ruy Frere de Andrada, was waiting on the coast of Persia, probably to attack our fleet, they were authorized to use "all advantages" against the Portuguese even in their own ports, if approved by a general council of war.

They arrived in Costack *(sic)* Roads (an open roadstead on the Persian Coast near Mínáb) on the 23rd of December, Hormúz being in sight about 10 leagues W.N.W. The English factors here informed them that the Portuguese had erected a fort on "Kismis," to which the Persians had laid siege for many months ineffectually, and had lost a great many men. (It appears that Emam Kooli Khan, Governor of Fars, had received orders from Shah 'Abbas to take Hormúz at any cost.) "Wherefore the Prince of Shiraz had demanded the aid of our ships against the common enemy, the Portuguese," *threatening otherwise to detain all the goods and money belonging to the Company in Persia.*

In a consultation on board the 'Jonas,' articles of agreement were drawn up for giving aid to the Persians, and sent to the Khan of Shiraz, then on his way towards Mínáb. The English consented to act under fear of an embargo being laid on their goods, and also because they considered it would be "for the public benefit and the securing a peaceable and profitable trade."

The agreement was ratified by the Persian governor subject to some points reserved for the king's decision; but "when the news of this agreement became known among the ships' companies, they refused to take any share in the business, but after much pains they were reconciled to it."

On the 19th of January, 1622, they anchored before the town of Hormúz, expecting that the enemy's armada would come out to fight; but as they did not, and as Ruy Frere de Andrada was in the new fort on Kismis, they sailed to that place, where they arrived next day. The Portuguese, who were in extremities, surrendered themselves and the fort to the English on the 1st of February. There were 17 guns and about 1000 persons of all sorts in the castle.

On the 4th of February the fleet proceeded to Gombroon, whence Ruy Frere was sent to Surat in the 'Lion,' accompanied by two pinnaces, so that only four ships (merchantmen too) and two pinnaces were left for the attack on Hormúz. This does not indicate much strength in the Portuguese fleet, or else much courage in their commanders.

On the 9th of February they sailed for Hormúz, having with them about 200 Persian boats, and next morning disembarked about 3000 Persians, who marched to the town "in a confused manner." They penetrated to the maidan or market-place without resistance, but here found barricades erected, from which the Portuguese were soon dislodged and driven into the castle. The Portuguese, it appears, were afraid of being intercepted in their retreat to the castle, and also of treachery on the part of the Muhammadan inhabitants.

The Persians plundered the town, breaking into all the shops and houses, and "wearied themselves with carrying away plunder all day," and at night slept out without any military precaution, "so that had the Portuguese made a sally they might have slain

* Dr. Careri's voyage around the world, 1694. Churchill's collection. The old priest's horror at our joining *infidels* against them is characteristic.

† Our ships were not allowed by the Portuguese to enter the Persian Gulf. Jáshak is a port outside the entrance.

numbers." Probably the "ancient" governor was not equal to such a determined proceeding.

The Persians then threw up trenches, and the English erected batteries for ordnance for them, also "sconces" and other works for protecting the trenches. The English vessels meantime engaged the Portuguese fleet from a distance, and sent in fire-ships, which on the 24th of February destroyed the 'San Pedro,' formerly admiral of Andrada's fleet.

On the 17th the Persians exploded a mine under one of the bastions, charged with forty barrels of powder, by which a practicable breach was made in the salient angle. They then made a fierce assault, and about 200 men made a lodgment in the bastion, but were eventually repulsed by the Portuguese, who fought bravely. The Persians also set fire to the city the same day, by command of the general, for the curious reason that his soldiers skulked in the houses, and could not be got to the attack.

The Persian army, now 4000 to 5000 strong, was (as may be imagined) without any stock of provisions, and what water was found in the cisterns in the city was soon used, so that had our ships been driven off by a Portuguese squadron, whose arrival was expected, the situation of the besiegers would have been very critical, as they had to send daily for provisions to the main. They were also badly provided with arms, "they had only small pieces, with bows and arrows, and swords; some of their chiefs had coats of mail."

The patience of the English was much tried by the fraudulent behaviour of the Persian general, who "broke conditions with them in several things" and had conferences with the Portuguese without letting the English know, and other breaches of faith.

On April the 2nd they exploded two other mines, forming a fair and practicable breach; but the Persians would not take advantage of it. The garrison were now getting short of provisions, and suffering from sickness. On the 14th and 17th other mines were exploded, when the besiegers assaulted with 2000 soldiers; a few Portuguese kept them back, the Persians clustering like sheep on the breach, and a flanking battery doing great execution among them, until at last they made a rapid retreat. Another assault on the 18th was also unsuccessful, but on the 19th they got possession of the entire bulwark, forcing the Portuguese to retire further within the castle. On this night a Portuguese frigate escaped the blockading ships, probably richly freighted.

On the 21st the Portuguese made overtures to the English, bearing letters from the captain of the castle and the Almirante, requesting the mediation of the English, and saying that, "if forced to surrender, as they soon must be, they would call upon the English for that purpose, as it were not reasonable for us to capitulate with the infidels when you are present." The English undertook their lives should be saved, and obtained a truce of two days, to draw up conditions. On the 23rd the Portuguese sent to put themselves in the hands of the English, on condition of being sent to Maskat or India. This was agreed to, and English and Persian officers were stationed at the gate to pass the garrison out, and see they took nothing with them. But the Persians conveyed the King of Hormúz with all the Muhammadans, with their treasure, and best things out of the castle by the breach; whole bales of goods, with boxes and caskets full of treasure to an unknown amount, were carried at the same time over the breaches. On the 24th both English and Persians began to pillage "in a shameful manner." In the evening the Khan of Shiraz came over from Gombroon, and made a triumphal entry into the castle, where were 300 pieces of ordnance (brass and iron). The English were employed protecting and embarking the unhappy garrison, who, to the number of 2500, left for Goa on the 27th, in two ships the English gave for the purpose, apparently out of the captured vessels. They were ill treated and stripped by the Persians.

The Persians evaded payment of a sum of money promised, and also of a share of the plunder, by counter representations of the embezzlement of plunder by the English, and the necessity of referring the matter to the king. Then says the account:—"After business was ended, our miseries began, occasioned by the insufferable heat of Ormuz, and the disorders of our own people in drinking arrack, and other excesses no less injurious." The ships lost many men, and eventually left Hormúz on the 1st of September, and arrived in Swally Roads on the 24th.

The sequel to the English expedition is curious. In 1624 a claim was set up by the Crown and the Duke of Buckingham, Lord High Admiral of the kingdom, by which the Company were required to pay a proportion of the prize-money which the ships were supposed to have received. In order to substantiate this claim, a number of the officers were examined, and it appeared that the amount was only calculated at 100,000*l.*, without taking into view the charges and losses incurred by the Company in the war, and by their ships being called off from commercial enterprises. It was at last compounded by a sum of 10,000*l.* paid to the Duke of Buckingham.

The place was utterly ruined by the Persians, who wished to transfer the trade to their new port, Bandar 'Abbasi, and has since remained in the same state. Even the building material appears to have been carried away and used for the new settlement at Bandar 'Abbasi. An old writer a few years later says:—"This poor place, now not worth the owning, was but ten years ago the only stately city in the Orient—This poor city is now disrobed of all her bravery—Ormus Island has no fresh water save what the fruitful clouds weep over her in sorrow of her desolation, late so populous."

After the loss of Hormúz, the Portuguese obstructed with their ships the navigation of the gulf, until a settlement was come to which allowed them a factory at Kung, with considerable privileges, by agreement between the crowns of Persia and Spain, Portugal being at that time united with Spain. They had certain allowances paid them in money, besides half the customs duties.

It is pretty clear that the strength and importance of the Portuguese settlement has been overrated, as well as the wealth and strength of the Arab kingdom. But little over 200 years elapsed between its foundation and capture by the Portuguese; and it then seems to have declined, until its final and total destruction 120 years later. The extent of ground available to build on, would not admit of what would be now considered a large city, and part of this was occupied by tombs and water cisterns. There also appears to have been a

plain, where "tournaments" and games were held by the "Moors." Nieuhoff says this was called Ardemira, which has the same meaning as Belvedere.

Bandar 'Abbasi* was first founded by the Portuguese in 1612, in which year they took it from the King of Lar, and built two forts. It was taken from them by Shah 'Abbas in 1614, who had then reconquered Lar. The old name of Gombroon is said to be Turkish, and to mean a custom house, "because it was the port where one embarked for Ormus, &c."

The prosperity of the English factory at Bandar 'Abbasi does not seem to have been remarkable, and about the middle of last century it was removed to Abú-Shehr, which was then rising into importance.

A. W. Stiffe, *(Lieutenant late H.M.I.N.)*

A HIGHWAY TO BOLIVIA.

Of all the Republics of the South American Continent there is perhaps not one so little known to the world at large as Bolivia. Possessed of immense internal resources, and teeming with untold wealth, it seems so completely cut off by its geographical position from outer communication, that its riches are of little value to it; while, on the other hand, the same reason has operated to retard that progress of civilization which all the neighbouring states enjoy in a greater or less degree—so that at the present day Bolivia resembles nothing so much as a nut, the kernel of which is only approachable by surmounting an obstacle which places it at a disadvantage compared with any other fruit, and this obstacle is, as I have said, its means of external communication.

Possessed of a comparatively insignificant extent of seaboard, and that remote from the capital, Cobija, on the west coast, is at present the only port in the Republic, and the only outlet for its commerce; while on the north, north-east, east, and south, the richest provinces are completely landlocked, notwithstanding that it would be found, by well directed exploration, that it is in the latter directions the true highway to Bolivia must ultimately be sought. Only recently a company has been formed for the construction of what is called the Madéra and Mamoré Railway, which is destined to complete the line of communication between the Rio Mamoré (which flows into the Rio Grande, and, flowing past Santa Cruz, takes a westerly and then northerly direction again at some distance from Chuquisaca, the capital of Bolivia, to Cochabamba) and the river Amazon, by which means it is believed that the ultimate connection between Bolivia and the old world will finally be established; while, within the last twenty years, attempts have been made to demonstrate the navigability of the Bermejo, the Pilcomayo, and the Otuquis, with the view of diverting its commerce eastward, by way of the great channel of the river Paraguay and the Rio de la Plata.

Personally I have little doubt but that these three tributaries of the Paraguay were intended by nature to convey the wealth of Bolivia to the east, in the same manner that they have for ages past drained its vast plains of their superfluous rainfall, and it only requires for nature to be assisted by a little human skill to witness the full and complete accomplishment of her design.

In a former article I showed what had been done by way of exploration of the Rio Bermejo, but I was not then prepared for the intelligence which has since reached England—about a fortnight ago—to the effect that the first steamer, belonging to the Bermejo Navigation Company, has succeeded in penetrating as far as Esquina Grande, about 720 miles from the mouth of the river, so that the capabilities of that stream to the purposes of commerce may now be said to have been conclusively established. The Bermejo, which flows into the Paraguay in about latitude 27° S., may be traced in a north and north-westerly direction, through the Gran Chaco, and the province of Oran to Tarija in Bolivia, situated in about 21° 50′ S. latitude, whence but a small "portage" intervenes between it and the river Pilaya, which flows into the upper waters of the Pilcomayo, which in its turn ascends beyond Chuquisaca, in latitude 19° 50′, so that even if the Pilcomayo be not navigable, as it is feared, near its junction with the Paraguay, there can be little doubt that the Bermejo will itself answer all the purposes of a riverine highway to the basin of the La Plata, and so into the Atlantic Ocean.

One of the richest of the provinces of Bolivia is, however, Chiquitos, the locality of some of the most celebrated of the Jesuit Missions, and it is through this province that the Otuquis flows, joining the waters of the Upper Paraguay in S. latitude 19° 52′, longitude 58° 16′ W., at a spot called Bahia Negra. As yet, the capabilities of the Otuquis for traffic have been but imperfectly ascertained, but there is no reason to doubt but that with a very slight exercise of engineering skill that channel might be opened up, and thereby a highway secured, offering far greater facilities for commerce than the more expensive and laborious route northward to the bosom of the Amazon. So long as forty years ago the importance of opening up the navigation of this river had impressed itself upon the Bolivian Government, for we find that, in 1832, one Señor Don Manuel Luis de Oliden made a proposition to Congress to that effect, in consideration of which the following act was passed on the 5th of November in that year.

"The Executive will grant to Citizen Manuel Luis de Oliden such aids as it may think proper, in order to enable him to establish a port at the confluence of the Rivers Otuquis, Tucabaca, and Latiriquiqui, or at such point as may be most suitable in order to open the navigation of these into the river Paraguay, conceding in addition those privileges which are due to him as the originator of this enterprise."

(Signed) I. Eustaquio Equibar, *President.*
Dionisio Bassientos, *Secretary.*

This act was followed, on the 17th of the same month, by a decree of the Supreme Government, granting, among other privileges, to Citizen Manuel de Oliden from the points he may select at which to establish a port on the river Otuquis, south of the province of Chiquitos, 25 leagues of territory in every direction to himself and his heirs absolutely. Even so late as the year 1854, endeavours were being made in London for the formation of a Colonization Company, to settle the "Oliden Grant," though they would appear to have fallen through; nor do I

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* *Voyages du Chevalier Chardin en Perse, &c.* Amsterdam, 1735.

hear that any further steps have been taken subsequently in this direction. The Oliden Grant, between the parallels of 17° 45′ and 20° 15′ S. lat., is bounded on the east by the Paraguay, and extends 150 miles westward. This includes the settlements and military posts now held by the Brazilian Government; but as the territory claimed by Brazil reaches but a short distance west of the Paraguay, and does not embrace any portion of the Otuquis River or Bahia Negra, their claim can in no way materially affect this grant, should the Bolivian Government be disposed to allow its provisions to be still in force, notwithstanding the time that has elapsed from the passing of the decree.

A very interesting account has been written by Mauricio Back, of the labours of Señor Oliden in this province. He writes:—

"The village of Santiago, which Mr. Oliden made, in 1833, the centre of his operations on the southern border of the province of Chiquitos, and situated on the cordillera of the same name, has a population of 1380 souls, and enjoys a temperate and salubrious climate. This cordillera, whence issues many streams, which form the river Otuquis, contains, according to reliable authority, mines of gold, silver, quicksilver, and precious stones. In the mountains are most valuable woods and medicinal plants. On the plains south of this cordillera are skirts of wood, palm, and grass lands suited for grazing: the soil is of remarkable fertility. At a distance of 7 leagues from the above-mentioned point, Mr. Oliden formed his first settlement on the Rio Agua Caliente (Hot River), over the ruins of the old town of Santiago founded by the Jesuits, which is now called Florida. The Rio Agua Caliente takes its rise in a warm lake 5 leagues south of Santiago. This settlement was composed, in the year 1836, of several handsome houses, which had been erected by order of the 'Empresario,' and is the point which he had selected for his own residence. He established large farms, which were cultivated with great success: corn, of which two crops were made annually; rice, equal to that of Bengal; mandioca of extraordinary size; coffee of superior quality; cocoa, sugar-cane, and tobacco—this last the best known—sweet potatoes, pea-nuts, beans of every variety, and every class of vegetables.

"He established estancias south of this town on rivers of never-failing water, where the grazing was abundant for the rearing of cattle, sheep, and mules. From Florida he opened a road to the Great Salina, distant 50 leagues, from which, by way of the Cordillera de Lances, it may be continued to Chuquisaca and Tarija. Another road was opened from Florida to Oliden—the central point of the new province—distant 16 leagues east. This was the situation of the old town of 'Corazon de Jesus,' founded by the Jesuits on an elevated plain by the side of the Rio Tucabaca; in latitude 19° 4′ S., longitude 61° 3′ W. from Paris. Another road has been opened from Oliden to the town of Santa Corazon, distant 22 leagues N.N.E. This town has a population of 1106 souls, and its climate is rather hot than temperate. On this road, and at a distance of 15 leagues from Oliden, the 'Empresario' established a 'Hacienda' or farm, which he called 'Sietos,' for the cultivation particularly of cotton and sugar-cane. Its product in the year 1836 was very considerable. In the vicinity of the town of Santiago on the Serrania of the same name, and in the valley formed by the same, he established another 'Hacienda,' called 'Rinconadra,' for the cultivation of the sugar-cane. Its product in the same year was equal to that of 'Sietos.'"

Some conception may thus be formed of the fertility of these lands; and as the Government of Bolivia has always been eager to encourage emigration, there is room to believe that before many years are over the lands granted to Señor Oliden will be fully colonized, a consummation which would no doubt be materially hastened by the opening up of the river to steam navigation.

In 1854 Captain Page, of the United States Navy, ascended the Otuquis for a distance of 31 miles from its junction with the Paraguay, and he adds in his account of that expedition that as the navigability of the river is supposed to be established from the high lands of Bolivia for a long distance in its course south-east, it only remains to determine the connection between these two points. The reason which prevented Captain Page from further exploring the Otuquis was that the channel was almost entirely closed by "Camelotes" and "Tapagem," or floating grass, which became so clogged in the wheels of the steamer as to prevent her further advance, though even at the point where he abandoned the enterprise there was still a depth of 9 feet of water, so that it may be reasonably supposed that there exists no insurmountable difficulty to modern science in the removal of this growth of weeds, and so freeing the channel for the passage of river craft of a moderate draught. Captain Page himself says, "I am convinced that a steamer properly constructed could skim over or cut through this sea of grass." Some idea of the size of this river may be gathered from the fact that at a distance of 25 miles from its mouth, the breadth from bank to bank was 600 yards, and the depth of water 14 feet. The aspect of the country is generally flat, except where to the north-east the mountains of Coimbra and Albuquerque loom in the distance; in every other direction nothing but grass and water as far as the eye can reach, with an horizon so clearly defined, "that," as Captain Page writes, "the altitude of a heavenly body might be taken during the day with the same accuracy as by observation made with a sea horizon."

Five years later this indefatigable explorer made a land journey by permission of the Bolivian Government into the province of Chiquitos as far as the town of Corazon, which has been before referred to; but he was at that time unable to carry out his own wishes by exploring the Otuquis River downwards from that point to the place where his former expedition terminated, and so conclusively demonstrating the complete navigability of the stream throughout its entire course. Captain Page, however, publishes the following interesting letter from Mr. Louis Vernet, who was thoroughly familiar with the history of the Oliden Grant, and which goes far to show the opinion entertained by those conversant with the subject. Mr. Vernet writes:—

"The circumstance of your not having discovered as yet the connection of the Otuquis River, at the point where it flows into the Bahia Negra, notwithstanding your repeated and laborious attempts, shows plainly the correctness of your idea that it should be found by entering the river from above, and it is to be hoped that the Government may have received your communication from near Santa Corazon, and followed your advice of examining the Otuquis from above. The

Government of Bolivia has shown, by its various decrees, the importance they attach to giving this new outlet to the commerce of the Republic, and all well informed Bolivians are enthusiastically in favour of the scheme; but the civil wars, the extensive wilderness which separated the mountainous populous parts of Bolivia from Oliden's Grant, and the total want of direct communication by land or water between the river Paraguay and the towns of Corazon and Santiago of the province of Otuquis, as also the ignorance of the geography of their country, and the want of a spirit of enterprise, are the great obstacles which Oliden's scheme has to contend with, and which to the Bolivians appear insurmountable, but which by a powerful foreign company might easily be overcome. Two companies were actually opened, one in Hamburg and the other in Paris, but the Crimean war broke up the first and the late great commercial crisis the second. Your exploration, if successful, will be a great stimulus to the formation of a company which, if not also interrupted by some crisis, would reap the immense advantages which the enterprise offers, and be highly promoted by the satisfactory information which you may be able to give respecting the accessibility of Santa Corazon or Santiago or the part of the Oliden where "Old Corazon" stood, and from whence the Jesuits used to send produce in river craft to Asuncion, in Paraguay. . . . . Mr. Oliden has opened roads between New and Old Corazon, between the latter and Santiago, and thence to the Salt Lakes. From Santiago and Corazon are ancient roads to Santa Cruz de la Sierra and to Chuquisaca, the capital of Bolivia. Communications between these towns by caravans of mules already existing, nothing is required to conduct Bolivia's trade through the Paraguay other than to effect a passage from the Bahia Negra into the River Otuquis."

From this correspondence it would appear as if Captain Page, at the date of its publication, had expressed some sort of doubt as to the river which he had originally explored in 1854 being the Otuquis itself, or only a prolongation as it were of the Bahia Negra, which previous writers had supposed to be merely a backwater from the Paraguay River, but which Captain Page himself has never doubted to be the legitimate downpour from the highlands of Bolivia, since he states—

"I am convinced that it is not the backing up of the Paraguay: the current forbids that idea, and the colour, even at its junction, is in strange contrast with that of the latter. Between the seasons of high and low water I cannot believe that the waters of the Paraguay could back into this bay, deposit detritus, and receive a colour unvarying from its mouth to the point of ascent (31 miles), black, and yet, in a glass, perfectly limpid, more so than the water of the Parana, while that of the Paraguay is uniformly turbid. This alone would convince me that it flows from the highlands of Bolivia, and may be a navigable stream into the interior of that country."

If there is any faith to be placed on the conclusions of this able navigator—and there seems no reason to doubt it—there only requires a little energy on the part of the Bolivian Government to open up for the Republic a permanent highway by way of the Paraguay to the Atlantic, which would be far less costly for all commercial purposes than the railway which is now in process of construction to the northward by way of the Madéra and Mamoré, and which, at the same time, would largely benefit the adjoining Republics of Paraguay and Argentina, by the trade which would spring up in these waters.

The time has come when the Bolivian Government is called upon to organize these explorations, and open up those outlying portions of its territory itself, which have been hitherto left to the comparatively inadequate resources of private or foreign enterprise.

Alfred A. Geary.

THE KASHGAR MISSION.

Mr. Forsyth and his party left Yarkand on the 28th of November, and found houses comfortably fitted up for them at each stage, on the road to Kashgar. The cold during the journey was intense. They reached Kashgar on the 3rd of December, being met about 3 miles outside the town by Mîrza Ahmad Kûshbegi, one of the highest officers in the court of the Atalik Ghazi, and formerly Governor of Tashkend, before that place was seized by the Russians. The British Embassy at Kashgar is described by the members of the Mission as a remarkably comfortable place. A spacious gateway leads into a courtyard with a broad verandah all round; and on two sides there are good large rooms for the attendants. Thence a gateway leads into a second quadrangle, on three sides of which are comfortable rooms for the members of the Mission, with good Khotan carpets, and the walls hung with velvet. Good fireplaces, with cheerful wood fires, make these rooms as snug as possible; and there is a good sized mess-room, with kitchen at the back. There are also good warm stables, with stalls for 50 horses. All this has been built specially for the Mission, about 50 paces outside the gate of the King's fort, and about 5 miles from the city of Kashgar. Neither Shaw nor Hayward ever reached the city, being left inside the fort of Yungi-Shahr. On the day of arrival the Atalik Ghazi requested the Mission to present themselves in a friendly manner, leaving the official reception for another day. Mr. Forsyth was received very cordially, and the other officers were introduced. The Atalik is described as a thick-set man, about 5 feet 10 inches high, with a broad, good-humoured face. He has now formally assumed the title of Amîr, and is now Amîr Yakub Khan, instead of Yakub Beg, as heretofore, the title of Atalik Ghazi will henceforward be dropped in speaking of him. On the 11th Mr. Forsyth presented the letter from Her Majesty and the Viceroy with all due ceremony, and the Amîr expressed the utmost gratitude. There is not the smallest sign of any restriction being put on the movements of the English officers. Now the treaty is signed (an event which took place on the 2nd of February last), it is expected that the Amîr will move to Aksu, which will give some of the officers an opportunity of accompanying him, and Captain Trotter hopes yet to float his canoe on Lob-Nor. The Amîr, who has received that title from the Sultan, intends to issue a silver coinage with his own name on one side, and that of the Sultan on the other; and the Turkish flag will be adopted in Eastern Turkistan. As regards the Kashgar bazars, nearly all articles of luxury come from Tashkend. Candlesticks, candles, and matches are all Russian. Needles, looking-glasses, and razors can all

be got at moderate prices, with Moscow trade-marks outside the packets. So far as trade is concerned, it will probably be long before the prejudice in favour of goods with which the inhabitants are familiar is overcome; and, by the Karakorum route, articles needed for common use can only reach Turkistan in small quantities. But the greatest of all obstacles lies in the views of trade adopted by our merchants who come from India. They do not see the advantage of a quick sale with a small profit, and decline to dispose of their goods unless they can realize at least 50 per cent. They cannot at once get paid in gold, and then return with the proceeds, or purchase such goods as they may wish to select, but must regularly settle down and barter little by little. The fact is, we are already late in our endeavour to get a footing in the market, and can only hope to make way slowly. The Kashgar Envoy to Constantinople, who returned with the Mission, brought with him two mountain guns and all the equipments, as well as seven or eight Turkish artillery officers.

After the formal reception, the members of the Mission will accept invitations to *ziafats* from the different men of position, and will return the hospitality in their own mess, at the Mission. They find it a great relief to meet with Muslims who know nothing of the prejudice which prevents the natives of India from such friendly interchanges of hospitality.

The Peking correspondent of the *St. Petersburg Journal* writes that, on the 8th of October last, after some days' fighting, the town of Suchan was taken by the Imperial Chinese troops. The importance of this lies in the fact that the town which commands the road into Dzungaria and towards Hami had been for no less than ten years in the hands of the insurgent Tungans, and had been made by them a base of operations. The Chinese Government is so elated at the victory, that it has rewarded the generals in command with exceptional honours. The troops have been ordered to march upon Urumtsi, Ngansi, and other towns to the west. It is anticipated that no serious opposition will be offered to their advance, the Tungan rebellion being so nearly crushed. But the increased probability of an eventual collision between China and her energetic neighbour, the Amir Yakub Khan, who is so busily cementing his friendship with England and Russia, cannot but give rise to a variety of speculations.

DR. BECCARI.

(The Italian Naturalist and Traveller).

LAST mail has brought in several letters from this distinguished and enterprising explorer, and I am glad to say good news of his health and hopeful projects of further travels. Beccari writes from Makassar, and his last letter is dated December the 26th. Since he left the Aru Islands he and his collections have had a series of narrow escapes. The *bughis prahu*, on which he had already placed his collections at Dobbo, and which was to carry them to Makassar, arrived at that port nearly in a wrecked condition, after a most disastrous passage. Beccari, on account of some dissension with the *nakodah*, placed his collections on another *prahu* in which they ran as narrow a chance, for amongst them were several Papuan skeletons. The sailors knew this, and as eight of their number died during the voyage, they attributed such mishap to the presence of dead men's bones on board, and would have thrown all Beccari's boxes overboard had not the *nakodah* (a Chinese) used vigorous means to prevent it. Again, the *prahu* with which Beccari had arranged to leave Little Kei for Makassar, and on which, for some trifling disagreement with the owner, he did not embark, foundered at sea, and the crew were saved by mere chance. Beccari appears to have gone in an open boat, and only four men, from Little Kei to Amboina, an undertaking considered foolhardy by the *Bughis* themselves.

Beccari writes to me that the *Bughis* go every year to the northern coast of Australia in search of *trepang*, visiting especially the neighbourhood of Melville Island. They call the land *Tanha Mereghi* and the natives *Orang-mereghi;* these they often bring with them to Makassar. Beccari has seen a lot in the streets of that town, and he has sent me several photographs of that most interesting people. He says that they bear a strong resemblance to part of the population of the Aru Islands. They have *very curly*, but not woolly or spirally-twisted hair; this appears to indicate a cross between pure Australians and Papuans. The features of the *Orang-mereghi* are *decidedly* Australian, and so is the shape of the body and of the limbs. I have long been much interested in the northern Australians, having personally studied those of the south. I believe that the use of bow and arrows, the custom of piling the skulls of their dead in heaps on the top of hills in exposed localities, and other habits in which they differ from the typical Australians, may be set down to Papuan agency. Beccari has greatly surprised me by hinting that the *Aeta* or negritoes of the Philippines are Papuans. I see that Miclucho-Maclay is also of that opinion, which is decidedly at variance with all our previous notions of those two peoples. I have compared photographs of the three branches of the pigmy brachycephalic negritoes inhabiting South and East Asia, viz., *Andamaners*, *Sámangs* and *Aetas;* all agree most closely, and differ unanimously from the *Papuans*, so splendidly described by Wallace. It is, however, evident that there are two varieties of true *Papua:* one tall, with prominent features, the other short, with broad and flat nose; both, however, entirely agree in all other matters, and have that peculiar spirally-twisted hair which naturally grows in *long tubes:* both have a dolichocephalous cranium. The hair of the negritoes is very peculiar—short, woolly, in little isolated spheroidal tufts, very like that of the Bushmen of South Africa, and of the *Akkas* described by Schweinfurth, who are also pigmies, and have a round (not elongated) skull. I have elsewhere suggested that the Akkas, Bushmen, and Asiatic negritoes, are one race of primitive men.

Beccari says that he considers the *Onin* of the south-west as typical Papuans; not so the *Mafor* of the north of New Guinea, in whom he suspects an admixture of Hindoo blood (?). He is going to send me a series of drawings of Papuan profiles, carefully executed with the *camera lucida*.

Beccari has sent with his last letter five chests containing natural history collections, principally zoological. He writes that at Celebes, in the Moluccas and Aru Islands, the belief in the giant cuttlefish (a kind of *kraken*), which drags down *prahus* with its huge arms

and great suckers, is general: it goes by the name of *Varcola* in the latter islands.

Beccari has now left Makassar for Kandari, an unexplored region of South-east Celebes, where he hopes to secure specimens of the great *Anoan* antelope *(Anoa depressicornis);* he has also heard of divers mammals which would prove new to the Celeban fauna. After that excursion he will return to Makassar, and either go back to New Guinea, or else visit Sumatra, with the intention of exploring the region inhabited by the *Maias* or orang-outang in that island, in order to add to the splendid series of specimens of that anthropomorpha, collected by him in Borneo, and complete his studies on the habits of those great man-like apes. At Makassar, Beccari met with the courageous Russian naturalist, N. von Miclucho-Maclay, *en route* for a second visit to New Guinea. Beccari was much pleased with Maclay, but grieved to see him depart for such an unhealthy region in a very bad state of health, and so reduced by fever attacks. Miclucho-Maclay intends visiting and residing for some time in the neighbourhood of Triton Bay, in order to continue his anthropological researches, begun amongst the natives of the opposite coast. The Governor-General of the Dutch Indies has promised to send a war steamer to fetch him back after a certain lapse of time. He was proceeding from Makassar to Amboina, where he intended getting a small schooner to convey him to Triton Bay. Becarri has advised him to go up on the hills, where the climate is less noxious. Miclucho-Maclay begged Beccari to give his news, as he did not intend writing any more to Europe before reaching his present destination.

Beccari says that the Dutch are growing rather jealous at seeing so many foreign explorers in their Papuasian dominions, and that they intend sending to New Guinea an exploring expedition fitted up on a grand scale; preparations had been made, but were stopped on account of the Acheen war, which by the way has already cost Italy the life of one of her noblest sons, General Nino Bixio, who lately died of cholera, caught in transporting Japanese troops on his ship the 'Maddaloni,' to Sumatra.

HENRY HILLYER GIGLIOLI.

FLORENCE, *February 20th*, 1874.

GEOGRAPHICAL PROGRESS IN INDIA IN 1873.

DURING the year 1873 there has been material progress made, under the immediate control of Colonel Thuillier, the Surveyor-General of India, with the General or Military Survey of the Native States of Central India, Rajputana, Central Provinces, and Bombay, by the Topographical Department. A one-inch survey is being made of all these Native States, as well as of British non-Regulation States yielding but little revenue, and which are of too rugged, poor, and difficult a character for the larger scale or more elaborate delineation of the Revenue Survey. An area of about 14,054 square miles has not only thus been laid down, intimately connected with the great triangulation, but, through the agency of photography, the whole of the one-inch sheets of the Survey have been rendered, and are in course of early publication.

The geographical exploration of the eastern frontier has likewise been pushed on vigorously, and all the intermediate territory occupied by the Lushais, or other tribes, and lying between the Kachar and Munipúr frontier, and Hill Tipperah, left undone by the Survey parties attached to the military expeditions under Major-Generals Bourchier and Brownlow in the previous season, has been very successfully described. The Garo Hills, hitherto a perfect *terra incognita*, have likewise, under the protection of the military expedition, sent to coerce those refractory and quasi independent people, been well delineated on the quarter-inch geographical scale—entirely filling up the blank which has so unaccountably existed on the map of India, for so many years under British rule, situated as it is so close between the long occupied districts of Goalpara and Gowhatty of Assam on one side, and Mymensing and Sylhet on the other.

In the Naga Hills, the survey has extended to Samagooting in the Naga Hill District and to the Munipúr frontier, and a few seasons more will, it is hoped, fill up all the hilly territory subtending the Assam Valley south of the Brahmaputra River.

The several exploratory parties in these eastern directions have added not less than 11,273 square miles of very fair geographical details to our previous knowledge of this frontier, the general map of which is now vastly improved, and presents a totally different appearance. The object of these operations is to enable the Government of India to select a proper line of defensive frontier, so as to avoid future conflicts with the Lushais and other semi-civilised tribes, which have long disturbed the peace of the frontier.

These Topographical Surveys, averaging an area of from 16,000 to 20,000 square miles annually, being drawn expressly for the purposes of reproduction by transfers from photographic negatives, are at once issued for the use of local officers and the public. A very superior description of printing by the collotype process, direct from the negative, is now in course of treatment, and, when matured, is likely to yield very superior results to those obtained by photo-zincographic printing. Prior to this latter discovery, the one-inch sheets of the Topographical Surveys could not be published, it being more than was practicable to reproduce the Revenue Survey one-inch results by hand-drawing for lithography.

Great progress has been made with the publication of the sheets of the Atlas of India, by copper-plate engraving, during the year. Since the introduction of engraving into the Surveyor-General's Department in India, great strides have been made in filling up the Atlas, the quarter sheets of which are now produced in as good style as they could be in England.

Of the British Revenue-paying rich and champaign districts, the surveys have advanced in the Derahjat and Delhi division of the Panjáb; in Rohilcund and south of the Jummu in the North-West Provinces; in the Sathpuras of the Central Provinces, now close on completion; in the Lower Provinces of Bengal and Assam, also nearly completed, in which the scale is four inches to the mile, with the exception of the districts of the North-West Provinces, in which a perfect cadastral or minute definition of every cultivator's field is being carried out on the sixteen-inch scale, which almost approaches the largest scale used in the Ordnance Survey of Great Britain for the record of

property. These Cadastral Surveys, under professional management, are introduced as the basis for the revenue settlements now making in the North-West Provinces.

Of the four-inch Survey, 10,280 square miles have been completed, and of the sixteen-inch Survey, 1870 square miles, besides topographical work to the extent of 4362 square miles, making a total of 16,512 square miles.

Topographical Surveys, on a scale of 2 inches to the mile, are likewise being prosecuted in the Bombay districts of Púna and Nasik, to supplement the revenue measurements of fields, conducted by the settlement department of that Presidency and for the purpose of securing proper topographical maps. The sheets of the northern division of the Bombay Presidency in the Atlas of India have for very many years been blank, and it is now determined to get them filled up and published with the least possible delay.

In the Madras Presidency, the Revenue Surveys on the sixteen-inch scale have been going on for many years, but the geographical materials derived therefrom are not yet rendered, or susceptible for incorporation in the Indian Atlas, which contains the results of the Old Military Institution Topographical Surveys of the southern peninsula, of half a century old, and which are now obsolete and require to be replaced by representations of the country as it exists at the present time.

On the Bengal side of India alone an area of about 41,800* square miles of country is thus annually surveyed, equal to about the half of England, which has to be manipulated and turned to ready account at head-quarters, thus involving a vast amount of labour in the various processes of computation of data, reduction, compilation, and publishing on different scales, to meet the wants of the civil administration of the country.

A first survey of all India is the crying want. This is now rapidly advancing, and may reasonably be expected to approach a satisfactory termination within the next ten years or so. With the great triangulation so well advanced, and covering almost the whole of India with its meridional and longitudinal series of triangles like a gridiron, the Topographical and Revenue Survey details are incorporated without difficulty, so as to combine with precision on to the general map, and to produce results of an undeniable character, worthy of a great national undertaking.

The last Annual Report of the Great Trigonometrical Survey of India (1872-3) has just been published, and from it we observe that of principal triangulation, 92 triangles, covering an area of 11,058 square miles, and of secondary triangulation 14,756 square miles have been measured; while of topographical surveying, which is also being carried on by three of the parties of this survey, an area of 2374 square miles, has been finished in the Gurhwal and Kumaon districts of the Himalayas, and of 3878 square miles, on a larger scale, in the rich and fertile districts of Guzerat, and the northern portions of Kattiwar, both in the Bombay Presidency.

The labours of the various parties employed in extending the network of triangulation over the vast expanse of British India, vary in point of difficulty according to the nature of the country traversed. For instance, in Vizagapatam, where Mr. Rossenrode's party was employed, the jungle fever is most banefully prevalent; it struck down Sir George Everest, when a young surveyor in 1818; and in the case of Mr. G. Shelverton—the first officer to take up the same work after a lapse of fifty years—it unfortunately proved fatal. In Assam the extraordinary growth of vegetation makes the clearance of a line of observation a very difficult matter; supplies and labourers have to be procured from a distance owing to the sparseness of population; the best time for observing (*i.e.* between the early showers and regular rains) is the most unhealthy, and in the dry season the villagers burn down the jungles, and cloud the heavens, along the whole extent of country, with an impenetrable pall of smoke. In Jodhpur, on the other hand, the country is sandy and free from tropical growth, and isolated hills form capital stations. Progress was thus an easy matter, though deficiency of water now and then occurred.

In Kattiwar the Topographical Survey is rapidly advancing, and when it reaches the shore of the Gulf of Kutch, efforts will be made to connect the survey with that of the gulf, made by Lieutenant A. D. Taylor, of the Indian Navy.

The Topographical Surveys of Kumaon and Gurhwal embrace a country ranging over 25,000 feet in altitude, from the deadly lowlands of the Terai, to the summits of the great peaks of the Himalayas. As might be expected in such a country, the health of the surveyors was not good, but, nevertheless, a good out-turn of work was shown for the season.

Tidal observations are being conducted at the head of the Gulf of Kutch, and these will be repeated during the next few years at different points along the coast, and connected with a carefully executed series of levels; the principal object being to investigate the nature of the changes in the relative levels of land and sea.

"Trans-Himalayan" exploration by means of native agency is going on in several directions. A Pathan has been sent to the region beyond the Hindu-Kush, with instructions to penetrate, if possible, into the *terra incognita* north of the Oxus, into Shignan, Roshan, Darwaz, and Karateghin. One of the Pundits has been sent into that part of Great Tibet beyond the northern watershed of the Bramaputra.

* Topographical Surveys, 25,327 square miles.
Revenue Surveys ... 16,512 ,,
Grand total ... 41,839

THE PRODUCTS OF WEST AFRICA.

AT the present moment a few remarks upon the products of the West African Settlements cannot fail to be interesting and instructive. The following table will show the value of the trade returns of the four settlements in 1871:—

	Imports.	Exports.
Sierra Leone	£305,849	£467,755
Gold Coast	250,671	295,207
Gambia	102,064	153,100
Lagos	391,653	589,802
Total	£1,050,237	£1,505,864

The principal exports from Sierra Leone are oil, nuts, and seeds; from the Gold Coast, palm-oil; from Gambia, ground-nuts, hides, and wax; and from Lagos, palm-oil, palm-kernels, ground-nuts, indigo, ivory, and cotton.

Palm-oil is derived from the pulp which covers the palm-fruit, and which grows in large bunches near the top of the palm-tree. These nuts are chiefly gathered or cut from the tree in April. They are first pounded for the purpose of separating the pulp, and are then boiled in water; the oil is skimmed from the surface and put aside for purposes of merchandize. A great proportion of this oil, as well as of the kernels of the nut, finds its way to this country, where it is chiefly used in the manufacture of candles, soap, &c. In Africa, when fresh, it is eaten as butter, and is also used for the purposes of making wine and soup. It is very nutritious and wholesome.

The geological characteristics of the Gold Coast are but little known, but it is quite certain that gold is extensively distributed. It is obtained in its greatest purity in Foutah Jallon, by the most simple process, either of washing the river beds or by digging holes in the earth which is richly impregnated with the precious metal. Gold dust is exchanged for cattle, rice, or other commodities, which are taken inland by the traders.

The interior of Africa abounds in beautiful flowers, upon which bees feed, and the result is that large quantities of bees-wax are deposited, which are collected by the natives. The export of this article has however fallen off considerably within the last twenty years.

The settlements are particularly suited for the growth of the cotton plant: the plant is indigenous to the country, but the cotton is short in staple, and therefore at present much inferior in value to American cotton. It is asserted that by care and cultivation a change in its character and quality would soon be effected. What is wanted, however, is to create a demand for African cotton at a remunerative price to the labourer. It requires more time than the ground-nut to arrive at maturity, and it can hardly be expected that labourers will be as willing to undertake its cultivation as they are now ready to devote themselves to the less tedious cultivation of the ground-nut.

Ground-Nuts.—Unlike the trade in gold, palm-oil, and wax, the ground-nut is the result of continuous and steady agricultural labour through a portion of the year. It is reasonable to suppose that natives engaged in agricultural pursuits which require steady labour and deliberate purpose for even four months in a year, thereby acquire more or less settled habits of life, and that they are naturally led to desire and purchase with the produce of their labour the manufactures and goods of other countries. The wants thus formed exercise in themselves a civilizing influence, and are more likely to multiply than diminish.

That portion of the natives of the Gambia who are engaged in the cultivation of the ground-nut, have shown for many years a great disposition to cultivate the soil when they can do so with security. It is a fact that more than one-third of the produce exported is raised by natives, who travel from distances of 500 to 700 miles in the interior to visit the Gambia, along the banks of which they hire small tracts of ground, which they cultivate. Most of these visitors remain in the neighbourhood until they have earned sufficient to purchase those goods the desire for which induced them to leave their homes. They then form into parties and return home, spreading amongst their countrymen the good tidings of a safe market for their labour. The value of ground-nuts raised in the Gambia, and exported from Bathurst in 1845, only amounted to one or two hundred pounds, whereas the average value of the same article of produce between 1854 and 1867 has been over 100,000*l.* a year. During the last few years there has been a falling off in the export, owing to the non-cultivation of the land, partly in consequence of the disturbed state of the country and partly from a falling off in the demand.

The oil obtained from the nuts is used in the same way as sperm-oil.

The trade is doubtless capable of great expansion, as there is abundance of soil; thousands of acres, which merely need the hand of the cultivator to make them teem with wealth; and if the population along the banks of the river should not be sufficient, thousands of natives would flock from the interior if there was a demand for the produce of their labour.

Of the Gambia generally it might be said that the capabilities of the soil to produce oil, nuts, seeds, &c., are unlimited. Local disturbances have constantly checked the prosperity of the settlement, but there seems to be growing up amongst the natives a disposition to avail themselves of the advantages which a cultivation of its soil offers.

There is undoubtedly an increasing community of feeling on certain points, and the self interest of the native chiefs and proprietors of the soil is teaching them the necessity of maintaining peace if they wish to extract from that soil produce sufficient to purchase articles which are becoming to them the necessaries of life.

With regard to the character of the natives, it may be asserted that those at Sierra Leone are the most progressive, loyal, and contented. Under English rule they have undoubtedly advanced both in civilization and intelligence.

On the Gold Coast the standard of morality is extremely low, and it is universally admitted that the natives will do no more work than is absolutely necessary for their subsistence.

At the settlement of the Gambia also, the habits of the population are far from satisfactory; there is a want of regular and steady industry, a carelessness and improvidence, and a great addiction to thieving and intemperance amongst them. It is from the interior of Africa, where, from their physical and intellectual superiority, the governing classes of the negro must for the future be drawn; that, after having created a demand for the fruit of their labours, we must look for the spread of that progress and civilization which is still so much needed. One of the results of the present war will doubtless be to open up the interior of the country to the trader, and to admit the natives of those parts to free access to the coast. Hitherto, all trade between the interior and the coast has been conducted by native agents, whose sole policy has been to squeeze the producer, and levy black-mail on him with a view of enriching themselves.

The climate is unsuited to the constitution of Europeans, but the soil is rich, and most productive. The capabilities of the country are admirably adapted to extensive cultivation, and the vast numbers and physical strength of the natives in the interior is, if they can but obtain free access to the trading ports, sufficient for that purpose.

W. Robinson, F.R.G.S.

Reviews.

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THE VOYAGES OF THE ZENI.*

THE Arctic Regions teem with points of interest to the student of physical geography, to the physicist, and to the naturalist. But great and absorbing as are their attractions from this point of view, they do not yield to any other part of the world in the romantic character of their historical associations, and in the amount of elevating instruction that is to be derived from a study of their comparative geography. While the story of Norse adventure connects Greenland with early European history, the thrilling narratives of later Arctic explorers have made the icy capes and floe-covered sounds of the north as household words at every British hearth.

Among all the problems in the comparative geography of the Arctic Regions, there is probably none that has commanded more attention than the questions bearing on the voyages of the two noble Venetians, who visited and described so many lands with strange names in the far north, during the 14th century. Pinkerton remarked that "Zeno's book is one of the most puzzling in the whole circle of literature;" and it is certain that the investigation of the perplexities which hang about the Zeno narrative, and the map which accompanies it, has hitherto baffled every commentator.

Mr. Major has brought a critical and well-balanced mind, and a judgment long trained in the careful examination of similar puzzles, to bear on this subject. His aim has been, not only to discuss the questions at issue, but to set them at rest. He is not satisfied with an endeavour to fortify his point of view with the most telling arguments and the most exhaustive research. His plan is to demonstrate each problem, that has caused perplexity to previous writers, with mathematical precision, and to reduce the solution of the various questions to certainty. All students who bestow ordinary attention on his introduction, cannot fail to concur in the verdict that he has succeeded.

Towards the close of the 14th century, Nicolò Zeno, a member of one of the noblest and most ancient families in Venice, went on a voyage, at his own expense, into the northern seas, and was wrecked on what he describes as the island of Frislanda, which Mr. Major has proved to be one of the Færoe group. He entered into the service of a chief named Zichmni, as pilot of his fleet, and wrote to his brother Antonio, inviting him to join him, which he did. Four years afterwards Nicolò died in Frislanda, and Antonio, after a further stay of ten years, returned to Venice. The narrative of the movements of the two brothers is derived from the letter from Nicolò inviting Antonio to join him, and from letters from Antonio to a third brother, Carlo Zeno, the famous Venetian Admiral. The Zeni accompanied Zichmni in a victorious attack on Eslanda, which Mr. Major has shown to be the Shetland group. There is also an account of a visit by Nicolò Zeno to Engroneland, or the Norman settlements of Greenland; and of the observations of some fishermen in two parts of North America, called respectively Estotiland and Drogeo.

The whole story had been written out by Antonio Zeno; but a descendant of his named Nicolò, born in 1515, when a boy, not knowing the value of these papers, tore them up. Luckily some of the letters escaped destruction, and, in after life, he was able to compile and publish the narrative, as we now have it, in 1558. He also found a map, rotten with age, in the Zeno palace, and made a copy of it. But, unluckily, he supplied what he thought was requisite for its illustration, from his own reading of the letters; and his interpolations have been the chief causes of subsequent perplexity. This younger Nicolò Zeno was a Member of the Council of Ten, and a nobleman of repute and position.

Several writers, and conspicuously Admiral Zahrtmann of the Danish navy, have thrown discredit on this work, and have even accused the younger Nicolò Zeno of having concocted it himself. Zahrtmann, in an elaborate paper (*Royal Geographical Society's Journal* v., p. 102), goes so far as to argue that the whole story is a tissue of fiction emanating from the pen of Nicolò Zeno, junior, in 1558.

Mr. Major, in his closely reasoned introduction, has proved Admiral Zahrtmann to be wrong on every point, whether in his facts or his deductions, and convicts him of throwing upon an honourable man a series of aspersions of the most ungenerous character.

One of Mr. Major's rules for fixing localities which have been written down by an Italian from the lips of Northmen, is to follow the narrative strictly, and to see what names of places tally, *not in form, but in sound*, with those that have been written down. This test has never been applied before. He thus identifies the Sudero Gulf of the Zeni with Suderoe Fjord in the Færoe Islands; Ledovo and Slofe Islands, with Lille Dimon and Skuoe; Bondendon with Norderdahl; and so on. The transmutation of Færoisland, the old name of the Færoe Isles, into the Frislanda of the Zeni is obvious enough. The chief Zichmni is identified with Henry Sinclair, Earl of the Orkneys and Shetlands.

The most important part of the narrative is the account of the elder Nicolò's voyage to Greenland, when he visited and described a church and a monastery in one of the Norman settlements, and furnished other interesting particulars. This information is supplemented by a most valuable document, consisting of sailing directions and a chorography of Greenland, by Ivar Bardsen, a native of the East Bygd, and procurator of the episcopal see of Gardar, who was sent by the Bishop with succours when the West Bygd of Greenland was attacked by the Skrellings or Esquimaux. Mr. Major has enriched the volume with a translation of Ivar Bardsen, from a collation of the copy given by Professor Rafn in his *Antiquitates Americanæ* with the one in Purchas. Captain Graah, the distinguished explorer of East Greenland, argued that the Norman colony, known as the East Bygd, was really on the west coast; but, in using Bardsen as a guide, he materially weakens his authority by arbitrarily altering his landmarks. Bardsen mentioned certain rocks called Gunnbiorn's Skerries, midway between Iceland and Greenland;

* *The Voyages of the Venetian brothers Nicolò and Antonio Zeno to the Northern Seas, in the 14th century:* comprising the latest known accounts of the lost colony of Greenland; and of the Northmen in America before Columbus. Translated and edited, with Notes and an Introduction, by R. H. Major, F.S.A., &c. (Hakluyt Society, 1873.)

and Graah, not finding them where Bardsen placed them, gives the name to some rocks close to the Greenland coast. Mr. Major has been able to restore the Skerries to their proper place as given by Ivar Bardsen. On a map of the world in the 1507 edition of Ptolemy, he has found a large island in the exact position, with the legend *Insula hæc Anno Domini 1456 fuit totaliter combusta;* and in a later map he has found a shoal laid down on the same spot, with the name of "Gombar Scheer," a sailor's version of Gunnbiorn's Skerries. In one of Jan van Keulen's charts of 1700 the soundings on this shoal are given. Having thus restored Ivar Bardsen's sailing directions to their integrity, Mr. Major demonstrates, which Captain Graah failed to do, that the East Bygd of Greenland was on the west coast.

We regret that our space will not allow us to follow Mr. Major in his equally interesting discussions respecting the visits of the fishermen to the American coast, and the position of the Icaria of the Zeni.

The actual narrative of the Zeni only covers thirty-five pages, and that of Ivar Bardsen fifteen. But the introduction is very complete, and Mr. Major, by demonstrating, beyond further possibility of cavil, that the publication of the younger Nicolò Zeno is reliable and authentic; by identifying the localities in the narrative, and explaining all the difficulties of the map, has performed a great and enduring service to geographical literature. He has restored the narrative of the voyages of the Zeni to their rightful place, as one of the most valuable chapters in the authentic history of early Arctic discovery.

EXPERIMENTAL MILITARY SURVEY OF THE RUSSIAN CONFINES IN ASIA.*

Under this modest title Colonel Veniukof publishes a volume containing 487 pages of subject matter, besides 79 pages devoted to tables of astronomical points and itineraries of routes. It is a republication of a series of articles which appeared in the *Russian Military Journal*, and which before their appearance had served as the ground-work of a series of lectures at the Military Academy. These papers, now collected into a single volume, form a useful text-book on the Russian possessions in Asia, or rather on those territories on the south-eastern verges of Siberia which Russia has acquired by treaty, appropriation, or conquest, from the period of the third decade of the present century.

This marginal territory is divided into eleven sections, which are respectively under the administrations of the Governors-General of Eastern Siberia, Western Siberia, Turkistan, and Orenburg, according to their location. Each section is treated in its entirety from a military strategical point of view as a *region* (*i. e.* an appendage to a Governorship-General), as a district, circumscription, or Governorship-General, as the case may be; and each "essay" is a compilation of all the information—statistical, orographical, geographical, topographical, hydrographical, &c.—which has been collected by travellers and by the Russian administration. The whole work, in an introductory chapter, is brought as it were under the lens of a critical review of the gradual but systematic extension of the Russian boundaries, and of the method of their defence.

Some of these articles have already been translated, as, for instance, the first, on the island of Saghalien (see *Journal of the Royal Geographical Society*, 1873), and that on Khiva (see *Bulletin de la Société Géographique de Paris*, Juin, 1873), whilst a German translation of the complete work is coming out by instalments at Leipzig.

Colonel Veniukof's work is one of those handbooks of the Russian empire which it has now become the rage to publish at St. Petersburg. Thus, for instance, the Imperial Geographical Society is engaged in bringing out the first Geographical Dictionary of the Russian empire, while various other societies are publishing the results of researches instituted in several parts of Russia Proper. By his present work, Colonel Veniukof renders an immense service to the Government of his country, for in a compact form he collates all the information amassed up to this time by travellers of numerous nationalities respecting the belt of country which girds the waist of Asia from the Caspian Sea to the Pacific Ocean. He has himself, as he observes in another work on the Russian confines, traversed between the years 1857 and 1863, a greater portion of the Imperial frontier from the Baltic to the Caucasus, and visited the Celestial (Thian-Shan) Mountains as well as the shores of the Pacific Ocean. He writes, therefore, authoritatively, and makes many original and highly interesting observations of a military-political character which have always great weight with men of real authority and influence in Russia.

La Perouse and Broughton, besides numerous other navigators, have completely surveyed the coast of the so-called "Maritime Region," between the mouths of the Tumen and Amur Rivers. The Japanese Mamia Rinso was the first to prove that Saghalien was separated from the mainland by a navigable channel, a fact which the Russians established in very recent times. The coast line is now thoroughly well known in scientific circles, although it still lacks a more popular description which would better bring its splendid scenery home to the imagination. The interior of the country, however, remains to all intents and purposes as little known as ever. Thus, although the Russians have been in possession of the country of the Amur River for more than 200 years, it is still in its virgin state of utter unproductiveness; and on every side, says Colonel Veniukof, there are tracts of land where no Russian foot has yet trodden. The southern portion of the island of Saghalien belongs to Japan, and the northern part to Russia; it is supposed, however, that the Russian Government is taking measures to secure possession of the whole island, with the idea of establishing a penal settlement in the more favoured southern portion of it. A writer in the *Ost See Zeitung* says that an equivalent in money will be offered to Japan, and that lamentable consequences will follow if it be not accepted. The fisheries in these waters are doubtless worth having—for the Japanese catch shoals of fish off the coast simply with their hands—while, according to one account of a voyage in those seas, the whales are so numerous that great care must be taken in approaching the beach lest the boat be upset by those monsters. As for the idea of forming a Russian penal settlement at the southern extremity of Saghalien, we

* Opyt Voënnago Obozrenia Rouskikh Granitz v. Azii.

have no faith in the success of such an undertaking, if it really be in contemplation; for the same process has entirely failed on the Amur and elsewhere. The announcement of such a project may be regarded only as a device to smother the susceptibilities of foreign nations, which might be aroused by the summary creation of a naval station in Anniva Bay or thereabouts. Mr. Ravenstein published, in 1861, a very excellent and interesting book, entitled *The Russians on the Amur*, which gave a great deal of information on the subject dealt with in the first two "Essays" in Colonel Veniukof's present volume.

The immense length of the Imperial frontier in Asia, which is about 7000 miles, coupled with the fact of the diversity in the physical character of the various localities along that line, as well as with that of the great varieties of races inhabiting the borders, naturally calls for a separate review of each section of that boundary. At the same time, as Colonel Veniukof observes, the political relations of the various neighbouring countries are likewise as diverse as the economical and other interests of each separate section of the line of frontier. "It is very evident" he says, "from a military point of view, that *all* the Russian Asiatic possessions cannot form *one* theatre of war in which a *single* commander-in-chief could operate with a *single* object." Accordingly, Colonel Veniukof examines each section of the frontier line as a distinct theatre of war.

The most interesting portions of this work are perhaps those on Manchuria and on those other portions of the Imperial frontier which remain almost completely open—that is, where nature offers no impediment to further advances.

Manchuria is treated by the author in its entirety, "because, owing to the natural wealth of that country, and its importance to China, it is capable of forming the basis of serious aggressive operations against Russia." The Trans-Baikal, or Khalka section of the line, has a peculiar interest from the fact that while the Russian side of the frontier is occupied by a settled population, the Chinese side is peopled by nomadic races, a circumstance which leaves the frontier practically open. The Altai Sayan section is fortunately protected by a mountain region which it is difficult to traverse, whilst on the other hand the Dzungarian section is intersected by transverse ranges, leaving easy passages from south to north, or *vice versa*. This is also a noteworthy section of the line.

It is followed by the Thian-Shan section which abuts on Eastern Turkistan. As the latter country is a state of considerable power, and has even established political relations with British India, the adjoining Thian-Shan section of the Russian frontier has been analyzed by Colonel Veniukof, topographically and ethnographically, in its entirety from a military strategical point of view.

Colonel Veniukof has also worked into shape all the dry materials relating to the countries which compose the Governorship General of Turkistan (divided into two sections; the mountainous district and the Aral or Steppe district). The Turcoman or Trans-Caspian section is separately considered. Particular attention is paid to the mountain passes and routes, to the nature of the soil, the climatology of the countries, the political character of the population, and to the military forces centred in the various localities. On all these points Colonel Veniukof does not pretend to give more information than is strictly necessary to the staff officers whom he instructs.

We cannot do justice to the entire work in a single article, and shall only in this first notice quote some of the most interesting passages which occur in Colonel Veniukof's introduction and in the notes to it.

Referring to the early establishment of Cossack settlements along the Russian frontier in the East, the author says, in a note—The fact of the gradual substitution of Cossack troops by regular forces is a matter of deep historical significance. It is to be taken as an evidence of the supremacy of state principles over popular interests, and of the systematic absorption of the liberties and privileges of individual elements in the body politic by its administrative centre. With the loss of their privileges, the Cossacks have lost that dash and spirit of enterprise which, in the 17th century, led to their conquest of fresh countries, and enabled them to retain those conquests without any assistance from the State. The Government has been consequently obliged to take upon itself the gradual colonization of the annexed lands, the extension and defence of the frontiers, whilst it found itself also obliged to set up authorities foreign to the soil. Here Colonel Veniukof puts the following significant question.—"What has Russia gained by thus changing the character of the forces with which she operates in the extension of her dominions, before reaching her inevitable frontiers in Asia?" In another part he observes that "the acceptance of the offer of submission made by Abul Khair, Khan of Khiva, in the year 1732, created the absolute necessity of penetrating into the innermost depths of Central Asia, in order that sooner or later our frontier may pass along the Hindu Kush and the mountains of Khorassan."

He frankly acknowledges that the various expeditions undertaken by the Russian Government, between the years 1834 and 1853, were undertaken in pursuance of a policy adopted at that time in official circles under the influence of a desire to compete with England. With reference to Colonel Veniukof's observations as regards Dzungaria and Eastern Turkistan or Kashgaria—the ruler of which latter country is regarded by Russia as a rebel and a mischievous propagator of Islamism—but with whom our envoy, Mr. Forsyth, has been lately negotiating a treaty of amity and trade, we find the following passages:—

"The experience of many years has taught us that, in order to preserve tranquility within our own dominions, it is necessary for us to extinguish the flames of rebellion in conterminous countries (Dzungaria); the interest of both empires (China and Russia) with respect to the barbarous people of Central Asia are perfectly identical, and call alike for the disarmament and pacification of those barbarians."

"The Kokand adventurer, Yakub-Beg (of Kashgar), relying on our peaceful temper, lost no time in taking up a strong position in Urumtsi, *i.e.*, at a point north of the Thian-Shan, with the direct and distinctly declared object of establishing a Mussulman State over the ruins of a Chinese supremacy. At the same time he is entering into a friendly intercourse with British India, whence he is supplied with arms and with military instructors."

ROBERT MICHELL.

(To be continued.)

THE INDIA DIRECTORY.*

"Is not London very empty and dull when the fleet sails?" asked a yamstalk young lady of an officer of the celebrated China fleet, then riding in all the pride of power and numbers at St. Helena—and this within the memory of many now living—and the question, simple and silly as it may appear, is only an exemplification of ideas by comparison; and although the glory of the great and mighty Honourable John Company is a thing of the past, the flag of Captain James Horsburgh, F.R.S., one of that ilk, still flies, to attest that it is still of the present or rather a connecting link between the past and the present, and to show that the school in which he was educated is not to be readily forgotten, and that although fleets may pass away and monopolist companies succumb to the advance of civilization and demands of the ever changing times, some landmarks are still left to denote their former glory.

To a maritime nation such as this, the very name of Horsburgh has become a "household word;" indeed, so much so, that to ask for an "India Directory" would raise a doubt, but to ask for "a Horsburgh," the man would be considered hopeless who did not at once understand what was needed; and time was when a vessel bound East would as soon have thought of leaving the sheet anchor behind as to start without a "Horsburgh."

But the times that have changed fleets and companies have also necessitated a change in the "Horsburgh." The Suez Canal would cause the young lady above quoted to consider that the glory of her own dear little island home had indeed departed, when scarcely a single vessel bound to or from China or the East Indies ever touched at the island, and we almost doubt if the late hydrographer of the late Honourable East India Company would have known his own work. The title page would startle him with its allusion to steamers; the first section would puzzle him exceedingly, for the Mediterranean as a road to the east would indeed be foreign to him, and the tracks laid down for vessels would be equally puzzling to one unacquainted with the mighty power of steam, cheating as it does monsoons and trade-winds and defying the power of calms to detain. Still, with all its changes, there is the same groundwork, the same indefatigable research apparent, and the same name, and, we may add, a little too much of the original work for the said change of times and methods of navigation.

The origin of this remarkable work may be considered to have been a few disjointed memoirs of different parts of the route to India, published, in 1805, under the title of "Memoirs: comprising the Navigation to and from China by the China Sea, and through various straits and channels in the Indian Archipelago."

This was followed, in 1809, by the first part of the Directions for Sailing to and from the East Indies, China, New Holland, Cape of Good Hope, and the interjacent ports; and Part ii. appeared two years after. These two volumes were in quarto, and contained between four and five hundred pages each, with the index. The labour bestowed on the work must have been enormous; but the store of accumulated treasures from the well-informed men who were continually passing to and fro over the same ground, and whose journals were literally the stones by which the goodly edifice was raised, was rich in the extreme; and so honest was the compiler that the praiseworthy desire to give every man his due, led to a prolixity, which however well intentioned was cumbrous to the work, and detrimental to its utility. At the same time it is to be wished that many subsequent writers of directories had as generously acknowledged their indebtedness to "Horsburgh" even at the risk of being prolix.

Many parts of the original work read strange, and even the proper names then used have undergone transmutation. We read of Scindy, Sincapour, and Typhoongs, for Sind, Singapore, and Typhoons; but it would not do to be critical in the matter of proper names, as we are by no means determined even at the present day as to whether the names should be inserted on our charts and in our directories as they are spelt, or as they are pronounced. With this digression, we resume our notice.

"Horsburgh" has passed through eight editions, in its original form, under different editors, who added considerably to its bulk without sufficiently curtailing the original matter, and thus the last edition attained a size of nearly double the number of pages of the original work, and became so bulky and prolix, that it may be said to have died of obesity. That great art in Sailing Direction writing, viz., terse language and short paragraphs was entirely lost sight of, for it not unfrequently happened that a paragraph ran to a page and a half, and that in folio; then the vague expressions were handed down, such as a rock being described as lying "at the distance of a musket shot from the shore," "a sail's breadth," &c., terms that have become obsolete, and which from their vagueness were not disused before it was time.

The work before us is still "Horsburgh," an old friend with a new face. Captain Taylor has, however, done his work well in his regeneration of the work, by breaking up the old type, adopting the system of brief paragraphs, dropping the marginal references or notices, and introducing abbreviations well understood by seamen, and also by block-printing names and words of importance, to catch the eye, and also in generally omitting the authorities which, as before remarked, rendered the work cumbrous.

The system of sections is also a great improvement. Of course the opening of the Suez Canal necessitated a notice respecting the navigation of the Mediterranean; and we are free to confess we should have thought it advisable greatly to have extended this second chapter of the first section, for even steamers will at times break their shafts, or otherwise get disabled, or run short of coal, and this chapter leaves them greatly to shift for themselves.

Once out of the Mediterranean, Captain Taylor is in his own domain, the Red Sea, the directions for which are terse and succinct. Of the matter of the "Horsburgh" proper, of the work, much has been left as it was, excepting in the alterations alluded to, and it may be added much more might still have been omitted with advantage; and in proof, we may adduce the table of the limits of the Atlantic trade-winds, pages 44 to 48, the wind charts published having quite superseded the necessity of such a table. Again

* *The India Directory:* Part the first, founded on the work of the late James Horsburgh, F.R.S., by Commander Alfred Dundas Taylor, F.R.G.S., late Indian Navy. (W. H. Allen and Co.)

in page 328 we have "Practical Hints about Compasses," which to any commander of ordinary intelligence would be useless, and even if of use, it is out of place and should have been in the introduction, under the head of "Deviation or Local Attraction."

Our concluding word, however, will be one of commendation for the nicely executed maps introduced, and also for the copious index, which greatly increases the value of the work. We can only wish as much success to the new launch, under the new flag, as was attained by the old.

THE SAILOR'S POCKET BOOK: a Collection of Practical Rules, Notes, and Tables, for the use of the Royal Navy, Mercantile Marine, and Yacht Squadrons. By *Commander F. G. D. Bedford, R.N.*, H.M.S. 'Agincourt.' (J. Griffin & Co., Portsea, 1874.)

THIS is a most useful little hand-book, and in 334 small pages contains an amount of information on various points, daily required by seamen, which is really astonishing. The object is attained by much thoughtful and judicious selection, which evidently entailed the devotion of no small amount of time and trouble. But the result is more than satisfactory, and Captain Bedford has done right good service. The book, which fits easily into a monkey-jacket pocket, is divided into ten sections. The first contains tables for mast-head angles, a table for computing the area of sails, and information respecting signals. The second section is on the compass, with rules for ascertaining the deviation, and for applying the correction for variation. The third is on the rule of the road at sea. The fourth section is extremely valuable. It contains information on the average limits of the regions of trade-winds and monsoons, with localities of cyclone storms and rainy seasons in the different oceans throughout the year. Here also are tables from Dove's law of storms, Buys Ballot's law connecting barometric pressure with the direction of winds, and other useful meteorological notes, as well as passage tables, and remarks on currents. This section is as useful to the merchant seaman as to the naval officer. The fifth section on hydrography, in the preparation of which Captain Bedford was assisted by Staff Commander Hull, the Superintendent of Charts, is also admirably arranged and condensed. It treats of lights, buoy systems, soundings, tides, methods of determining positions and measuring distances, and the management of chronometers. The sixth section is devoted to boats, their weights and dimensions, and general hints on their management; the seventh is devoted to gunnery; and the eighth contains hints on saving life from shipwreck, and on restoring the apparently drowned. The ninth gives money, weights, and measures of all nations, rules in mensuration, and for calculating tonnage of vessels, floating powers of spars, number of square yards in sails, &c.; while the last section contains a mass of miscellaneous information, such as particulars of docks abroad, tensile strain of anchors, scales of provisions, and receipts.

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MEETING THE SUN: A Journey all Round the World. By *William Simpson, F.R.G.S.* (Longmans, 1874.)

WE have before us a gorgeous book, resplendent in red and yellow, the Nuptial and Imperial colours of China, and covered with Chinese devices and symbols of a highly mysterious character. It furnishes us with a graphic description of a tour round the world by way of Suez, Singapore, Hong-Kong, Peking, Japan, San Francisco, and New York, and is illustrated by a number of capital engravings, reproduced by the heliotype process from larger sketches done for the *Illustrated London News*. The author's chief object in making this tour was to illustrate, by pen and pencil, the grand doings in connection with the recent marriage of the Emperor of China. The letters he wrote and the sketches he made, are here incorporated into an octavo volume of a respectable thickness, and the result is very much what might have been expected. The drawings are very good, and the letter-press is light, chatty, and very readable. At the same time the latter bears traces of haste in composition, and there are occasional inaccuracies which would not perhaps have occurred had Mr. Simpson had works of reference at hand when first writing. For instance, we are told, *apropos* of Chinese theatres, that the old Greek drama had but *four* performers, the truth being that it had but *one*, a number which in later years Æschylus increased to two, and Sophocles to three. Again, Milton's line

"And utmost Indian Isle, Taprobane"

is called unmusical, because (we rather suspect) the author does not pronounce it after Milton's classical fashion. As a quadrisyllable it closes the line quite metrically and harmoniously. On the same page we are told that Ceylon is the supposed Ophir and Tarshish of Scripture. Now Tarshish is very generally acknowledged to have been a generic term applied to the various Phœnician colonies of the Mediterranean, while the testimony is so convincing as scarcely to leave any room for doubt, that Ophir was the ancient Saphar of Ptolemy and Pliny, an important city in Arabia Felix, where the kings of Yemen formerly dwelt.

Mr. Simpson excels in description, but his occasional remarks of a more serious character are worth attention, such as his observations on the rapid progress made by American civilization in Japan, China and Hong Kong. Many of the various stations *en route* had been visited by the author previously, so that his sketch of the improvements and general progress, which had taken place meanwhile, are of special interest. We can recommend the book as excellent light reading.

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TURKESTAN: Auf Grundlage einer im Jahre, 1871, unternommenen Bereisung des Landes. *Geschildert von Alex. Petzholdt.* (Leipzig, 1874.)

M. PETZHOLDT journeyed through the Russian province of Turkistan three years ago, and is now engaged on a large volume in which are to be recorded his detailed experiences of the country. On account, however, of the interest attaching at present to Central Asia, he has anticipated the larger work by publishing the present brochure, which gives, succinctly, valuable information on the people, their manners and customs, and the fauna and flora of this region, as well as some speculations on the probable future of this expansive and expanding portion of Russia's dominions.

With regard to this latter point, he recalls the emphatic words of Prince Gortchakoff in December, 1864, when he expounded Russia's Eastern policy, and fixed the line of the Syr Daria from Fort Petrovski to Lake Issykul as her natural frontier limit. The subsequent conquests of Tashkend, Samarkand, Khojend and Kuldja, our author points out, show what a gulf exists between Russian promises and actions. Bokhara and Khokan, he continues, are certainly doomed to be swallowed up, as also are the predatory Usbeg tribes to the south, as far as the Hindu Kush. But this, he holds, will not embroil us with Russia as it is only in the ordinary course of events that each power should expand and seek its *natural* (as opposed to *political*) boundaries, and that the semi-savage tribes between should gradually merge beneath the irrepressible wave of civilization. Russia will eventually derive much benefit from her Turkistan province, in the export of raw stuffs,

such as cotton, wool, silk, hides, cattle, dried fruit, and dyes; while the imports, which are almost exclusively Russian, are increasing, and will in course of time create an invaluable market for Russian manufacturers.

Viewed as a whole, this work appears to us of value in its first and second parts, which treat of the author's experiences and observations in his travels; but in the third part, where he launches into the political aspect of the Eastern question, he is a little out of his depth, through an insufficient acquaintance with the subject.

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AN OUTLINE OF THE THEORY OF THE GREAT OCEAN CURRENTS. By *Captain N. Schilling, of the Imperial Russian Navy.* (St. Petersburg, 1873.)

CAPTAIN SCHILLING, of the Russian Navy, has published a pamphlet in which he gives in outline the theories which have been put forward with respect to the great currents of the ocean and the prevailing winds. He attempts to reduce to a general formula the theories on this question which have been propounded by authorities of the past and present generations, and comes to the conclusion that none of the explanations which have hitherto been given of these phenomena are in any way consistent with the facts. The oceanic and atmospheric currents are subject to general laws, and the equilibrium of the water of the ocean as well of the atmosphere is disturbed by common causes which Captain Schilling classifies thus:—

1. The variations in the specific weight of the water and atmosphere.
2. The revolution of the earth round its axis.
3. The attractive forces of the sun and moon.

Captain Schilling does not believe that the equatorial currents are produced by prevailing winds (trade and anti-trade), although he thinks that those winds may somewhat increase the rapidity of these surface currents; and while admitting that "we have not yet arrived at a satisfactory solution of this question," he endeavours to prove by illustrations that the constant currents which flow parallel with the equator, and with intermediate zones of still water, are attributable exclusively to the attractive influences of the sun and moon.

"With respect to the trade-winds," says Captain Schilling, "we observe that they also in their main features fall in very well with the deduction from our hypotheses, although in some instances, as for example in the change of zone of the trade-winds it may be observed that the sun does not exercise an influence in combination with that of the moon. At the same time, as the attractive power of the moon is greater than that of the sun, we must conclude that the heat of the sun also affects the trades, in accordance perhaps with Harvey's theory, or through the agency of the vapours which have generally an immense influence over all atmospheric phenomena."

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NOTE ON THE VALLEY OF CHOOMBI. By *Dr. A. Campbell, late Superintendent of Darjiling* (Paper read before the Royal Asiatic Society).

WHEN Dr. Hooker and Dr. Campbell were exploring the Sikim Himalayas, they attempted to enter the valley of Chûmbi by the Chola Pass (14,900 feet above the sea), but were stopped by a Chinese official with a military escort. No European has ever visited the valley itself, although Dr. Campbell has described the route to it from Darjiling, and from it to Lassa. In the present paper he gives some account of the valley, which lies in the Eastern Himalayas, and on the road from Darjiling to Lassa, between Sikim and Bûtan. It forms a useful addition to what is known of the border lands between India and Tibet.

SIMLA METEOROLOGICAL OBSERVATIONS.

THE first volume of a valuable series of meteorological observations taken at Simla by Major-General J. T. Boileau, F.R.S., during the years 1841 to 1845, has been published by order of the Secretary of State for India in Council. It embraces the observations of the several meteorological instruments taken at intervals of two hours during the years 1841 and 1842, and of one hour during the years 1843 to 1845; also observations of Daniell's Hygrometer, and of the dry and wet bulb thermometers taken daily at the four six-hourly periods, 4h. 29m. and 10h. 29m. A.M. and P.M., mean time at Simla, being the magnetic hours of mean time at Göttingen nearest to the periods of maxima and minima at Simla (3 and 9 A.M. and P.M.) as directed in the instructions issued by the Royal Society in the year 1840.

The hourly and daily means of all the instruments observed and the results will be given in a separate volume, which may be expected to be published in the course of the ensuing autumn.

The value of an extended and complete series of observations taken at an altitude of 8000 feet is very great, while it is enhanced by the fact of their being one of the most complete and carefully made records ever taken. Copies of the work will be placed in the hands of the principal observers in India, as the acknowledged growing importance of the science in that country renders it desirable to bring together observations recorded over as extended an area as possible.

EAST AFRICAN SLAVE TRADE.

AN interesting lecture on the East African Slave Trade was delivered on Wednesday, the 18th instant, at Leamington, by Major Euan Smith, C.S.I., who in his capacity of private secretary to Sir Bartle Frere, in the recent Zanzibar Mission, had ample opportunity of gathering experience and forming an accurate judgment on the odious traffic from every point of view. The lecturer gave a sketch of the various steps which had been made towards an abolition of the East Coast Slave Trade, and which culminated in the appointment of the Zanzibar Mission. True, the treaty placed before the Sultan was not signed till after the Mission had left, but the prescient eye of its chief never doubted of its ultimate success, and the result justified his judgment. Major Smith laid, however, especial stress on the vital necessity of following up the first step with vigour and decision. The inaction resulting from the recess and the prorogation of Parliament had had a mischievous effect, the Arabs were re-organizing the land route along the coast and a strong squadron in those waters was urgently needed.

A graphic, but certainly not overdrawn, description of the now happily closed Zanzibar Slave Market was given, while the lecturer did not omit to mention a happy augury of better times in the fact that a church is now being built on the very site of the old slave market.

The Mission visited Madagascar, and Major Euan Smith evoked a hearty laugh by a humorous description of the extraordinary costumes adopted by the higher officials in the island, as well as by their indiscriminate use of British words of command in military evolutions. It may be observed *en passant*, that these phrases seem to have an extraordinary attraction for semi-savage warriors. Even in countries remote from British intercourse, the words of command used in our army are caught up and eagerly adopted.

The lecture, which was illustrated by a large diagram map of Africa, lent by the Royal Geographical Society, was listened to with deep interest, and a cordial vote of thanks was passed to Major Euan Smith on its conclusion.

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BESCHREIBUNG des Oberamtes Brackenheim. Hsg. von statistischtop. Bureau (Würtemberg). Mapand views. 8vo., pp. 458. Stuttgart, 1874. 4s. 3d.

STATISTIK des deutschen Reiches, hsgn. vom Kaiserl. stat. Amte. 3 Band (Foreign Trade, 1872). 4to., pp. 378. Berlin, 1873. 9s.

BEITRAGE zur Statistik d. Königr Bayern. Hsg. v. stat. Bureau. Heft 27 (Educational Statistics, 1869-72, by Dr. J. Mayr, pp. 350). 16s. Heft 28 (Census of 1871; population of parishes, pp. 270). 5s. 3d. Munich.

HACK (C.) Statist. Mittheilungen der Stadt Mülhausens 1872. 8vo., pp. 160. Mülhausen, 1874. 4s.

JAHRBUCH für die amtliche Statistik d. bremischen Staats. Hrsg. v. d. Bureau für Statistik. 6th year, Part II. (Miscellaneous Statistics for 1872, with a hypsograph map. 4to., pp. 248. Bremen, 1874. 7s. 6d.

WANDERUNGEN durch Deutsch-Lothringen. Kurzer Beitrag zur neueren Landeskunde. 8vo., pp. 116. Stuttgart, 1874. 1s. 6d.

AUSTRIA.

OESTERREICHER (Capt. T.) Die Oesterreich. Küstenaufnahmen im Adriatischen Meere. Im Auftrag d. Reichskriegsmininisterium. 5 Plans. 8vo., pp. 216. Triest, 1873. 3s. 4d.

AUSWEISE über den auswärtigen Handel der Oesterreichisch ungarischen Monarchie, 1872. Hsg. v. d. stat. Central Commission. 4to., pp. 294. Vienna, 1874. 6s.

SWITZERLAND AND ALPS.

SCHWEIZERISCHE Eisenbahnstatistik, 1868. Hrsg. vom Stat. Bureau. 4to., pp. 142. Map. Zurich, 1874. 6s.

JAHRBUCH des oesterreichischen Alpen-Vereins. Vol. IX. 5 Maps. 8vo., pp. 432. Vienna, 1873. 10s.

ZITTEL (E.) Rings um die Jungfrau. Touristenblätter aus d. Berner Oberlande. 16mo., pp. 164. Karlsruhe, 1874. 3s.

ITALY.

GREGOROVIUS (F.) Wanderjahre in Italien. 2 vols. 8vo., pp. 734. Leipzig, 1874. 12s.

AUSSERER (Rev. P.) Pilger-Führer oder Wegweiser nach Rom u. durch d. Heiligthümer d. Heil Stadt. Map. 8vo., pp. 552. Mayence, 1874. 6s.

STATISTICA del commercio speciale 1873, pubbl. dal Minist. delle finanze (Dir generale delle gabello). 4to., pp. 30. Florence, 1874.

STATISTICA giudiziaria penale del Regno d'Italia, per 1870. Folio pp. 780. Rome, 1872.

STATISTICAL del regno d'Ialia. Popolazione e moviments dello stato civile nell' anno 1870, comp. per cura del Min. d'agricoltura, industria e commercio. 4to., pp. 392. Mican. 1872.

ANNALI del Ministero di agricoltura industriae commercio, 1873. I Trimestre, vol. 63 (Industria a commercio). 8vo., pp. 186. Rome, 1873.

CINQUINS (A.) Cenni Storici e geografici d'Italia sull' età media e moderna ad uso delle scuole liceali. 2 parts. 8vo., pp. 512. Biella, 1874.

MUZZI (S.) Vocabolario geografico-storico-statistico dell' Italia nei suoi limiti naturali. In parts. 8vo., pp. 64 each. Bologna, 1873. 1s. 8d. a part.

STATISTICA del Regno d'Italia. Movimento della navigazione nei porti del Regno, 1871. 4to., pp. 144. Florence, 1873.

STATISTICA del Regno d'Italia. Amministrazione publica. Bilanci provincials, 1871-2. 4to., pp. 32. Rome, 1873.

STATISTICA del Regno d'Italia. Istitute di previdenza casse di risparmio, 1868. 4to., pp. 122. Rome, 1873.

SPAIN.

DOUSSEAU (A.) Grenade. 8vo., pp. 155. Map. Le Havre, 1873.

GREECE.

TOZER (Rev. H. F.) Lectures on the Geography of Greece. Map. 8vo., pp. 420. London, 1873. 9s.

ASIA.

LUBOMIRSKI (Prince J.) Un nomade, Safar-Hadgi. Les Russes à Samarkand. 12mo., pp. 328. Paris. 1873. 2s. 6d.

WIJK (J. E. van der.) Aardrijkskundige beschrijving van Java. 2e. vermeerderde druk, Map. 8vo., pp. 232. Zalt-Bommel, 1874. 2s. 6d.

SEPP (Dr.) Jerusalem u. das heilige Land. Pilgerbuch nach Palaestina, Syrien, u. Aegypten. 530 illustrations and maps. 2nd edition. Schaffhausen, 1874. In parts at 1s. 3d.

STARK (K. B.) Nach dem griechischen Orient. Reise-Studien. Map. 8vo., pp. 420. Heidelberg, 1874. 7s. 6d.

ROESLER (Rob.) die Aralseefrage noch einmal geprüft. (Repr. f. Proceedings of Vienna Ac.) 8vo., pp. 88. Vienna, 1874. 1s. 5d.

DESCRIPTIONES terrae sanctae ex saeculo VIII, IX, XII et XV. S. Willibaldus. Commemoratoriumde casis Dei. Bernardus Monachus. Innominatus VII. Johannes Wirziburgensis. Innominatus VIII. La Citez de Jherusalem Johannes Poloner Nach hand- u. druckschriften hrsg. v. Titus Tobler. 8vo., pp. 539. Leipzig, 1874. 16s.

STUMM (Lieut. H.) Aus Chiwa. Berichte. 5 maps. 8vo., pp. 136. Berlin, 1873. 4s.

WEIL l'Expedition de Khiva. 12mo., pp., 72. Paris, 1874.

AMERICA.

POUSSIN (Major). Les Etats-Unis d'Amérique. Moeures usages et coutumes politiques. Force militaire, &c. 8vo., pp. 144. Paris, 1874.

MISSIONSGESCHICHTE in Heften (by Rev. Schwarzkopff). Heft 8, Labrador. 8vo., pp. 88. Berlin, 1874. 4d.

MARCEDO (M. de). Notices on the Chorography of Brazil. Translated by H. Le Sage. London, 1873. 9s.

ARCTIC REGIONS.

BATES (H. W.) The second German Polar Expedition, in 1869-70, under the command of Captain Koldewey. 8vo. Maps and Illustrations. London, 1873.

AUBEL (H. u. K.) Ein Polarsommer. Reise nach Lappland u. Kanin. Map and Woodcuts. 8vo., pp. 424. Leipzig, 1874. 8s.

Cartography.

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Pissis's Topographical Map of Chile.*

THE thirteen sheets of Aimié Pissis's map of the Republic of Chile are now before us, and although they do not perhaps respond to the rather pretentious title under which they appear, they must nevertheless be looked upon as an important and welcome addition to our geographical knowledge of South America M. Pissis, already favourably known through a number of geographical and geological works, was charged, in 1848, by the Government of Chile, to conduct a survey of their territory. He lost no time in setting about this task, but the funds which the Chilean Government voted for the purpose were far from adequate, and instead of having under him a numerous staff of efficient assistants, capable of surveying within a reasonable time, and in a satisfactory manner, a country so extensive and offering so many physical difficulties, M. Pissis was fain to enter upon his gigantic task with two assistants only; and with this inadequate help he worked on until 1855, when an astronomer and three additional surveyors, trained at the Engineering College at Santiago, were placed under him. But even then his means were small for the task set, which was actually completed in the course of little over twenty years. Looking at the time and resources available, a regular trigonometrical survey, such as we are accustomed to in Europe, could certainly not have been produced, especially as a geological survey was to be conducted simultaneously with the topographical one. M. Pissis therefore felt constrained to content himself with a mere sketch survey. He measured, however, five base lines, varying in length from 2000 to 3300 feet, and, making use of conspicuous mountain summits in lieu of trigonometrical signals, he carried a series of triangles from lat. 27° S., down to lat. 38° S. determining in this manner eighty-one positions of the first order with sufficient accuracy. This work, as well as the detail survey of the northern portion of Chile, was completed in 1865. It was found impossible, owing to the absence of conspicuous landmarks, to extend the triangulation further south, and the map of the rest of the country, down to lat. 42° S., is therefore based upon a number of latitudes determined astronomically, and of longitudes obtained by chronometer expedition despatched from the observatory of Santiago. The detail surveys were made on a scale of 1:100,000. They do not however extend to the more remote parts of the country; and Aurauco in particular, as well as a large portion of the southern provinces, appears to have been laid down merely from oral information. Nor need this be wondered at; for, by distributing the area delineated amongst the members of the surveying staff every one of it, including the director and the astronomer, was called upon to map on an annual average, no less than 760 square miles. The survey has been published on a scale of 1:250,000, which is amply sufficient, looking to the nature of the survey and the spare population of the country. The map shows two classes of roads, the boundaries of provinces and departments, railways and mines. The geological formations are merely indicated by letters, but an edition, coloured geologically, has no doubt been issued, though we have not seen it. A sombre tint, similar to that with which our Admiralty Charts have familiarised us, is spread over the whole of the map; the object of this, to our mind, is not apparent, except it be to hide the nakedness of the land, for the paucity of details and names in many parts of the map is most striking. The delineation of the ground—that stumbling-block of so many topographers—is far from successful. We do not quarrel with the introduction of an oblique light, but should have expected that the Andes and the coast range with the longitudinal Llano intermedia bounded by them, which constitute so marked a feature of the geography of Chile, would have been brought out in a more striking and characteristic manner. M. Pissis, however, is probably not chargeable with this failure, which may be due to want of skill and intelligence on the part of the engraver, and is compensated for, to some extent, by the large number of altitudes scattered over the map. More serious, to our mind, is the frequent neglect of surveys carried on and information collected by competent persons not officially connected with M. Pissis's enterprise. This neglect is particularly observable with respect to the coast-line, which might certainly have been laid down more accurately, especially in the southern provinces. The surveys of Captains Gormaz and Señoret (not to mention the older surveys of Fitzroy and King), published in the Memorias annually presented to the National Congress by the Minister of Marine; the labours of Philippi, published in the Annals of the University of Chile and other periodicals since 1842; the researches of Frick, which appeared in *Petermann's Mittheilungen* for 1864; Rosetti's survey of a railway route over the Planchon Pass, as well as other explorations of some importance—these all have remained unnoticed, or have been noticed only in a superficial manner. Whether the differences found in latitude and longitude of places along the coast, as compared with our own Admiralty Charts, are to be accounted as errors committed by older observers, can be decided only after M. Pissis shall have published the full report on his labours, upon which he is now engaged.

But in spite of the deficiencies pointed out, the work before us marks a decided step in advance of our knowledge of the geography of Chile. To recognise this fact, we need only compare Pissis's map with that published by Gay in 1854, or with the map compiled from materials collected by the United States Astronomical Expedition to the Southern Hemisphere, under Gillis. Chile, which occupies so respected a position amongst the Spanish Republics of South America, will, no doubt, advance upon the path she has entered upon; and this first essay of a topographical map will be followed, at no distant date, by a survey conducted with larger resources and in a more exhaustive manner. To M. Pissis we shall always feel indebted for the work he has completed under difficulties of no ordinary nature, and within such a short space of time. *Bis dat qui cito dat* fairly applies to him, and the gold medal bestowed by the Geographical Society of Paris in recognition of his services to geographical science has been richly deserved.*

Indian Famine Relief Map.†

THOSE amongst our readers who desire to follow the reports of the special correspondents of the daily papers despatched to the famine-stricken districts of India cannot do better than purchase the map the title of which is given below. It is a skeleton map of the Patna Division, comprising the districts of Sarun-ghumparun, Tirhut, Shahabad, Behar, and Patna, and exhibits the administrative boundaries, the canals, roads, tanks and reservoirs. What renders it particularly interesting at the present moment is an indication of the grain-stores and depôts, and of the new roads which it is proposed to construct as "Famine Relief Works." These latter are no less than 700 miles in length, and their completion must ultimately prove of great benefit to the country, by fur-

* Plano topografico y geologico de la republica de Chile levantado por orden del gobierno e bajo la direccion de A. Pissis. Scale 1:250,000. Engraved and printed at Paris. No date.

* We may mention here that a reduction of the northern sheets of this survey has appeared in *Petermann's Mittheilungen* for 1870, and that Dr. H. Kiepert has published a map of Chile in the Berlin "Zeitschrift" for 1859, in which have been embodied the materials available up to that date.

† Skeleton Map of the Patna Division. Famine Relief. Scale 8 miles to the inch. Calcutta, February 1874. London: Trübner & Co., Allen & Co., King & Co., and E. Stanford. Price 2s.

nishing an outlet for its produce, and affording means of access to the most remote districts, should a disaster similar to that which now threatens to decimate its population overtake it at some future time.

Maps of the United States.

EVER since the termination of the deplorable civil war in the United States the exploration of the vast territories of the West has been resumed and carried on with unflagging vigour. Any doubt respecting the progress actually made within the last ten years will be removed if we compare one of the best maps of the Union, published about 1865, with the beautiful six-sheet map of the United States just issued from Perthes's geographical establishment.* Dr. Petermann has put forth in this map the whole of his skill as a cartographical delineator; he has produced a work of sterling value which fascinates not only on a cursory glance, but bears the test of a closer examination. For the first time, perhaps, we are presented by him with a conscientious delineation of the grand physical features of a considerable portion of the North American continent, and though full of detail, his map, owing to a skilful arrangement of facts, leaves little to be desired as regards clearness.

But nothing can stay the irresistible progress of the Far West. Even whilst Petermann's beautiful designs were in the hands of the procrastinating engraver, whilst the finished plates passed through the printing press, and the printed copies through the hands of the colourer, thousands of immigrants turned their backs upon Europe to take up their abode upon the new continent. The old towns increased in population, fresh settlements were established in places hitherto the haunt of the Red Indian, railways and roads penetrated regions where only slowly-travelling trains of waggons had been seen before, explorers crossed portions of the country not visited hitherto except by the trapper, and the geologist's hammer resounded upon rocks to elicit information respecting the history of the country and its mineral resources. Every step in advance enlarged our geographical knowledge, and this at a rate which far outstrips the progress of the graver of our toiling artizan. And thus it happens that, even at the date of publication, maps of so progressive a country as the United States do not fully represent the present state of our geographical knowledge concerning it. If any proof were wanted in support of this assertion it would be furnished by the fact of our being called upon to notice, simultaneously with the completion of Petermann's work, the publication of two American maps, which throw a fresh light upon portions of the United States' territories. In Europe we are accustomed to the geologist following in the track of the topographical surveyor. In the United States the two offices are not unfrequently combined, and the geologist is called upon to explore the mineral resources of regions the geography of which is but imperfectly known, if at all. Hence, in order to render his geological reports intelligible he is compelled to make a survey of the country under exploration, and for this reason the American geological reports, looked at from a purely geographical point of view, possess an interest which our European geological surveys do not. To this circumstance we are indebted for the maps now under notice. Professor J. D. Whitney has been engaged upon the geological survey of California ever since 1860. The civil war retarded the progress of his work, but did not entirely stop it, and, having published a series of magnificent volumes, illustrating his and his assistant's labours, he now presents us with a map of California and Nevada,† which exhibits, within a small compass, the results of his topographical surveys. The map, as far as California is concerned, is based upon the state geological survey, and the United States coast and land surveys. Nevada is delineated from the survey of the fortieth parallel under C. King, from the explorations of the U. S. engineers under Williamson and Wheeler, the Central Pacific railway survey under Butler and Ives, and the Californian surveys conducted by Wachenreuder, Craven, Wilson, and Loehr in 1862-72. It shows railways, roads, and country boundaries. The hills are printed in brown, and a solid tint is spread over the whole surface of the map. The intention of producing a physical map is evident, but equally evident is the total failure in this respect (due, to some extent, no doubt, to the lithographer and printer). No country in the world offers a better opportunity for an effectual rendering of the features of the ground than California, as will readily be granted on inspecting Petermann's map. Yet here we find the mighty barrier of the Sierra Nevada scarcely more prominent than the comparatively insignificant ridges scattered broadcast over the inland basin, and the great longitudinal valley, which forms so striking a feature of the Pacific state, is scarcely brought out with sufficient distinctness. Yet, a skilful draughtsman, making use of this map for purposes of compilation, could easily repair this defect (for there are numerous altitudes to guide him), and the map in other respects contains so much that is new and interesting, as to possess a value altogether independent of the delineation of the ground. Very far superior in the latter respect are the two maps resulting from F. V. Hayden's United States geological survey of the territories, which may be described as very favourable specimens of the art of engraving as practised in the United States.* These maps embrace a large portion of the territory lying between lat. 43° and 46° N., and long. 110° and 112° west from Greenwich. The Yellowstone National Park, with its wondrous collection of geysers, hot springs, extinct volcanoes, and fearful cañons, forms their central point of interest, and our notions respecting the geography of this part of the United States are altogether revolutionised by them. Yellowstone Lake, 7788 feet above the sea, still constitutes the principal feature of this, the most magnificent "National Park" of the world; but Madison Lake to the west of it, which forms so marked a feature on the map published a couple of years ago, has shrunk into comparative insignificance, whilst Shoshone Lake, 7870 feet above the sea, occupies the south-western corner of the Park. The Lewis fork of the Snake River flows from this lake, traverses lower down Jackson Lake (6806 feet), and finally passes through a succession of fearful cañons to the prairie-lands of Idaho. To the west of the Snake River rises the imposing mountain range of the Tetons, with Mount Hayden, 13,833 feet, as their culminating point. The hills on one of these maps are printed brown, on the other they are indicated by contours at intervals of 100 feet. In both cases they are rendered most effectively.

New Maps.

KIEPERT (H.) Physikalische Wandkarten (Physical Wall Maps, Nos. 1 and 2, Eastern and Western Hemispheres) 10 sheets each. Berlin, 1873. 10s. each.

LIEBENOW (W.) Special Map of Central Europe. Sections

* A. Petermann: Map of the United States. Scale 1:3,700,000. 6 sheets. Gotha, 1874. 8s. (Originally published in the new edition of Stieler's Hand Atlas.)

† State Geological Survey of California: J. D. Whitney, State Geologist:—Map of California and Nevada, drawn by F. von Leicht and A. Craven. Scale, 1:1,140,480. 1873. Washington. 2 sheets.

* United States Geological Survey of the Territories, F. V. Hayden in charge. Map of the sources of Snake River, with its tributaries, together with portions of the head-waters of the Madison and Yellowstone, from surveys of the Snake River Expedition, by G. R. Bechler, chief topographer, and J. Stevenson, director. Scale, 1:316,800. Washington, 1874.

United States Geological Survey of the Territories, F. V. Hayden in charge. Montana and Wyoming territories, embracing most of the country drained by the Madison, Gallatin, and Upper Yellowstone rivers. Geology by F. V. Hayden, assisted by A. C. Reale. Drawn by H. Gannett from notes and sketches by A. Burck, chief topographer of the Yellowstone Division. Scale, 1:316,800. Washington, 1874.

90, 91, 103-105, 116-119, 130-133. Scale 1:300,000. Hanover, 1874. 1s. each.

MESSTISCHBLAETTER vom Preussischen Staate (Plane table sections of Prussia, surveyed by officers of the General Staff; published by the Board of Trade). Scale 1:25,000. Sheets 203, 254, 306, 320, 334, 348, 349a, 349b, 359 to 366, 376 to 383, 393 to 397, 398a and 398b, 409 to 413, 425, 426, 429 to 434, 438 to 444, 448 to 453. Berlin, 1873. 1s. a sheet.

GENERAL-STABS Karte von Preussen. 1:25,000. Amt Ritzebüttel. 6 sheets. Berlin, 1874. 1s. each sheet.

BERENDT. Geological Map of the Province of Prussia. 1:100,000. Sheet 9 (Lithuania). Berlin, 1874. 3s.

SEEKARTEN der deutschen Nordseeküste (charts of the German coasts of the North Sea, published by the German Admiralty). Berlin, 1874.

Sheet 1.—German Bight, from surveys of Captain Grapow and Lieutenant Hoffmann, 1867-69. Scale 1:300,000. 4 sheets. 6s.

Sheets 5 and 6.—West Coast of Schleswig-Holstein by Captain Grapow. 1:100,000. 4s. each sheet.

Sheet 7.—Mouths of the Jade, Weser, and Elbe, by Captain Grapow, 1867-8. Scale 1:100,000. 4s.

CARTE DE LA FRANCE dressée au dépôt des fortifications. Scale 1:500,000. Sheet 4 (Index map), sheet 5. Paris, 1874.

ZIEGLER (J. M.) Map of the Upper Engadin. 4 sheets. Zürich, 1874. 17s. in sheets, 21s. 6d. in case, mounted.

KELLER (Dr. F.) Archæological map of Eastern Switzerland. 2nd. edition. Zürich, 1874, with descriptive letter-press. 6s. 6d.

HAMMER (A. M.) Carta postale dell Italia. Nürnberg, 1874. 10d.

Waaterstaatskaart van Nederland (Hydrographical map of the Netherlands). Scale 1:50,000. Prepared by order of the Home Office under the direction of P. Caland and J. A. Besier. Harlingen 1 to 3, and Ameland, 4 sheets. The Hague, 1873. 2s. 6d. a sheet.

KAART VAN SUMATRA. A Map of Sumatra, based upon C. F. Baron von Derfelden van Hinderstein's General Map of the Dutch East Indies and the more recent authorities, and published, by the King's command, under the superintendence of Lieutenant G. A. Tindal of the Dutch Navy. Scale 1:2,000,000. The Hague, 1873. 1s. 8d.

PIERRE (Director of the Botanical Gardens at Saigun). Exploration des provinces occidentales du royaume de Kmer, 1870. Paris, 1873.

ERHARD and P. LEVY. Mapa de la Republica de Nicaragua, y parte de los Honduras y Costa Rica. Paris, 1873.

WEBER (K.) Map of the Province of Chi-li (China). Scale 1:1,022,000. St. Petersburg, 1872. (In Russian.)

FRIEDRICHSEN (L.) Karte der Palau Inseln (Chart of the Palau or Pelew Islands (Carolinas) 1:300,000. Hamburg, 1874. 2s.

WERNER (Capt.) Karte des Hafens von Sabanilla (Chart of Sabanilla Harbour, from a survey made in 1873). 1:50,000. Berlin, 1874. 9d.

ANTARCTIC EXPLORATION.

M. LUDOVIC MARTINET has submitted an interesting memorandum to the Paris Geographical Society on the subject of Antarctic exploration. In opposition to the general opinion regarding the greater cold of the Southern Pole, he advances a theory, founded on some experiments of Professor Tyndall's, in favour of the probability of a warmer temperature prevailing in those regions. The chief reason why so little of the Antarctic circle has been explored, lies in its remoteness from inhabited countries. There are, however, three oceanic currents which appear to offer natural routes for the investigation of this southern "Unknown Region" (a region, by-the-bye, exceeding Europe in area). These are, firstly, a southern branch of the Gulf Stream, which washes the eastern coast of South America, and which appears to merge in the Southern Ocean in the latitude of the Falkland Isles; secondly, the current which flows through the Mozambique Channel, southward towards Enderby Land. The great Sargasso Sea, it may be observed, in the vicinity of Marion and Kerguelen Isles proves the existence of two opposing currents in this part of the ocean; and, thirdly, the great warm stream which flows past the western shore of the Panama Isthmus, crosses the equator, washes the Marquesas, and Society and Easter Islands, and finally loses itself in the Antarctic circle between 140° and 170° W. long.

Log Book.

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The Arctic Expedition.—The sudden dissolution of Parliament unfortunately had the effect of delaying any decision on the subject of an Arctic Expedition. When the late Ministry resigned, no definite reply had been received by the President of the Geographical Society to the letter in which he urged the consideration of this national subject on the attention of Mr. Gladstone. But it is known that the arguments submitted to Mr. Goschen had made a favourable impression upon that right honourable gentleman; while the press is as nearly as possible unanimous on the subject. The *Daily News*, *Daily Telegraph*, *Standard*, *Morning Post*, *Globe*, *Pall Mall Gazette*, *Observer*, *Saturday Review*, *Spectator*, *Illustrated London News*, *Broad Arrow*, *United Service Gazette*, *Nature*, *Athenæum*, *Academy*, *Contemporary Review*, and *Cornhill Magazine*, have all pronounced emphatically in favour of this country resuming her glorious position, as of old, in the van of Arctic discovery. The Arctic Deputation, thus strongly supported by public opinion, will now bring the subject of an Expedition before Her Majesty's Government with well-grounded hope of a favourable result. Mr. Disraeli, it will be remembered by those who were labouring in this cause, in the days of the Franklin search expeditions, was always a warm and generous supporter of Arctic work.

The Extreme North reached by the 'Polaris.'—The American Geographical Society had a reception of the crew of the 'Polaris,' at the great hall of the Cooper Institute in New York, on the 16th of last February. The most important question that was raised was as to the state of the ice up Robeson Strait, at the furthest point reached by the 'Polaris' in 82° 16′ N. After the reading of a paper by Dr. Hayes, Captain Buddington, the master of the 'Polaris,' stated that that exploring ship was met by such heavy pack-ice, that further progress was an impossibility, and that no open water could be seen beyond Newman Bay. Captain Tyson, the second master of the 'Polaris,' affirmed, on the other hand, that heavy dark water clouds could be distinctly seen to the northward, that open sea appeared to be not over 8 miles distant; and that, if the occasion had been taken advantage of, as it ought to have been, this open water could have been reached. Captain Chester, the first mate, declined to address the meeting. But he informed Captain Markham, when on board the 'Arctic' last summer, that the 'Polaris' was only stopped by a very insignificant stream of ice, through which a vessel like the 'Arctic' could easily have forced a passage, with a water sky beyond. Dr. Bessels, the chief of the scientific staff, Mr. Schumann, the engineer, and the two able seaman, Hermann Siemens and Henry——entirely corroborated this statement in frequent conversations with Captain Markham.

Return of the Channel Squadron.—In consequence of the sudden and unexpected dissolution of Parliament this magnificent fleet of ironclads returned to England a month earlier than was anticipated.

On the 11th of March, after having performed their full-speed trial across the Bay of Biscay, on which occasion a speed of 11 knots was attained by the whole squadron, the ships separated off Ushant; the 'Agincourt,' 'Northumberland,' 'Resistance,' and 'Triumph' proceeding to Plymouth; the remainder, consisting of the 'Hercules' and 'Sultan,' going on to Portsmouth. During the last five months these vessels have been employed cruising along the west coast of Spain and Portugal, and visiting the island of Madeira. Rear-Admiral G. Phipps Hornby is still in command of the squadron, and the masterly and seamanlike manner in which the huge and apparently unwieldy ironclads are handled by him, excites the admiration of all that serve under his command. As an instance, it may be mentioned that on the occasion of the late visit of the fleet to Lisbon, the squadron in close order was led over the bar, on which a heavy sea was breaking, and up the Tagus, and anchored in the exact positions assigned to them, although a heavy S.E. gale was blowing at the time, entirely precluding all communication with the shore.

The various ships composing the squadron are under orders to be docked and refitted, and to be ready for sea by the 1st of May, so as to be prepared to take part in the rumoured forthcoming Naval Reviews in honour of the visit of the Emperor of Russia to our shores. The discipline, good order, cleanliness, and efficiency of the Channel Squadron is such as will be sure to reflect credit upon the Rear-Admiral at present commanding, who is universally and deservedly popular.

The statement in the *Western Morning News*, which has been copied into several London papers, respecting desertions from the ships of the Channel Squadron, is entirely devoid of truth in every particular. There were no desertions from H.M.S. 'Sultan' during the stay of the fleet at Lisbon, or indeed during the whole of the recent cruise.

The Bengal Famine.—At page 513 of the March number of *Ocean Highways* reference was made to the reasons for not prohibiting the export of grain, which are given in the minute by the Governor-General. Lord Salisbury, in his speech in the House of Lords, has further explained the considerations which have led the Government to refrain from interfering with private trade. The exported grain has not been exported from the suffering districts. In some parts of Bengal there is a large surplus crop; and the prohibition to export grain would have paralyzed the operations of private trade. The supply for present purposes is abundant, and (owing to the operations of private trade not having been interfered with) the traders have never been alarmed, and are now in the natural course of things conveying their stores of grain to the famine districts at the rate of 2000 tons a day. An opposite policy would have deranged and paralyzed the operations of traders, would thus have thrown the whole burden of relief arrangements on the Government, and would have led to most disastrous consequences. Lord Northbrook's admirable firmness has averted this danger. The great and only difficulty is, therefore, not to procure grain, but to transport the supplies to the homes of the suffering population. Every nerve is now being strained to secure this all-important object. Since November the railway has carried into Bahar 355,000 tons of food on private and Government accounts; and the Viceroy had ordered 80,000 tons more from Burma.

The Winter in Persia.—The winter of 1871-72 in Persia, immediately following the famine, was considered the coldest on record. But that of 1873-74 has surpassed it, both as regards fall of snow and lowness of temperature. Heavy floods have destroyed nearly a third of the city of Shiraz, and other towns have suffered more or less severely. In about the middle of March, by which time winter has usually entirely ceased, there was a fall of nearly 18 inches of snow over nearly the whole country. The rainfall at Bushire, this year, has reached the unparalleled height of 12 inches — the usual annual rainfall seldom exceeding 2 inches. Heavy snowfalls have also been reported at Constantinople; and it would seem that the winter has been as remarkable for its severity in Western Asia, as for its mildness in England.

"Telegraph and Travel."—Sir Frederic Goldsmid's work, under this title, will appear in the course of the spring. The construction of the electric telegraph in Persia has had a sensible effect on the progress of civilization in that country; and a narrative of the operations of the officers who executed this important work will be most interesting. Sir Frederic also relates incidents of travel while traversing routes in Persia, and the countries on her western frontier, which are but imperfectly known to the general reader. His opening chapter contains a memoir of the late Colonel Patrick Stewart, who died from the effects of exposure and overwork at Constantinople, before the success of his labours could be made manifest. Sir Frederic Goldsmid took up and completed his work.

Mr. Ashton Dilke on Central Asia. — The return of Mr. Dilke from Russia enables us to look forward to an interesting evening meeting to be devoted to the subject of Central Asian geography at the Geographical Society, on the 13th of April. After briefly describing the routes he took, Mr. Dilke will give an account of the province of Kuldja, which no other Englishman has visited; and will discuss some points of the highest geographical importance, bearing on the hydrography of Central Asia.

Affairs in Kokan. — During last summer a serious revolt broke out in Kokan. The Khirgiz and Kipchaks rose against the Khan, took possession of the town, and looted the treasure-house. In the mountain ranges to the south and south-west of the town this revolt is still in full vigour, and the Khan's executioner, on the other hand, is busy at work. At one time a fair prospect of a peaceful settlement appeared, for the Khan despatched an ambassador to offer terms, and forty delegates of the Kipchak tribes returned with the messenger to make their humble submission. The Khan, with the characteristic treachery and violence of these petty eastern potentates, caused all forty of the delegates to be beheaded. This has prolonged the struggle, and unless quiet is soon restored, it is said that Russia will take strong measures to ensure peace throughout the Khanate.

Murder of the "Mirza."—We regret to hear of the reported death of this energetic native explorer, attached to the Great Trigonometrical Survey of India, who is so well known for his exploration of the southern source of the Upper Oxus, and for his journey across the Pamir Steppe to Kashgar. He and his son-in-law had been travelling through Afghanistan, but for some time no letter had been received, and at last a report reached India that, while traversing the road from Herat to Maimana, he and his assistant were murdered, while asleep, by their guides. Endeavours are being made to get fuller information, and to recover the Mirza's papers.

Lieutenant Cameron's Journey to Unyanyembe.—The letters and sketch-map sent home by Lieutenant Cameron afford the means of judging of his efficiency as a traveller. Exclusive of the detention for thirty days at Rehenneko, caused by circumstances over which he had no control, he was 107 days marching from the coast to Unyanyembe in the worst season of the year. Captains Burton and Speke, in 1857, were 134 days, and Captains Speke and Grant, in 1860-61, were 114 days. The daily rate of all, including stoppages, was about 4 miles. Captain Speke took twenty-eight observations for latitude and seven for longitude. Cameron, going over old ground and simply verifying, took nineteen for latitude and four for longitude. His observations agree well with those of Speke. So excellent a beginning gives promise, if illness does not overmaster the gallant young explorer, of good work to the end.

Discoveries of Guano on the Peruvian Coast.—The Commission appointed by the Peruvian Government to survey the deposits of guano south of Iquique has submitted its report. In Pabellon de Pica over 6,000,000 tons of pure guano were found, containing a large proportion of ammonia. On the Punta de Lobos there are 2,000,000 tons, and in Chanabeya 150,000 tons, all of excellent quality. The surveying party executed plans, profiles, and measurements of each deposit. A second commission has been appointed to carry out a more complete and exhaustive investigation.

Surveys in Bolivia. — The wise measures of the Bolivian Government, with reference to the employment of engineers to execute surveys, will lead to a large increase in our geographical knowledge of this interesting part of South America. Mr. Reader Harris, at present in this country, is now Engineer-in-Chief to the Government of the Republic of Bolivia; and a staff of engineers is employed under him. The system, when a speculator applies for a concession to construct a railway, work a mine, or for any other purpose, is to cause a survey to be made by the Government engineers, for which the applicant pays. Thus much valuable work will gradually be done, not only by the engineers in the execution of their duties, but also through the mere presence of educated and intelligent Englishmen in the country. Mr. Reader Harris has already caused a careful survey to be made of lake Tiquina, the southern portion of lake Titicaca; and the map is very shortly expected to arrive in England.

Correspondence.

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THE PORTUGUESE COLONIES IN AFRICA.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In continuation of my letter in *Ocean Highways* for December, 1872, p. 286, I now have the honour to forward some further notes on the Portuguese Colonies, their productions, usages, and customs, especially with reference to the Zambese, Zumbo, Tete, and Senna. The Zambese is one of the most notable rivers of Eastern Africa. It crosses the Monomotapa, washes Zumbo, the plains of Chicova and Tette, divides the mountains of Lupata, passes close to Senna, and discharges itself into the Mozambique Channel through seven branches, the most northern one being the Cuama, which enters the sea near Quelimane. Its width varies, according to the parts it traverses. In Lupata, although extremely deep, it is only from 200 to 300 yards broad. Below Zumbo there is a spot where those who navigate the river are obliged to unload their canoes, and drag them over the rocks, because of the violence of the current there. Like the Nile, it fertilizes the fields by its inundations. These take place from November to July. After this season the river subsides considerably, but even then, according to the evidence of Dr. Livingstone, it is never low enough to be fordable.

It is during the time of the floods that the climates of Senna and Quelimane become exceedingly unhealthy, in consequence of the drift matter that floats down with the current of the river. The Zambese has auriferous sands. Livingstone observed some in which gold could be seen in minute particles, differing from the gold of Mashinga which is larger, and also from that of Abutua and Manica, which is found in pieces the size of grains of wheat. There are also coal mines on its banks. Chicova, once so celebrated for its silver mines, still abounds with this metal. The iron ore is of so excellent a quality that after smelting it resembles the best Swedish iron, both in colour and hardness.

According to Dr. Kirk, the year on the banks of the Zambese may be divided into three parts: the cold season, the warm, and the rainy season. Three months of winter, May, June, and July; three months of summer, August, September, and October; and the remainder of the year the wet season. Ordinarily the water of the Zambese is absolutely pure. The negroes who inhabit the banks of the Zambese are in general strong and robust. They apply themselves to agriculture, having given up the breeding of cattle in consequence of the tsetsé fly, the veritable curse of those regions. My friend Fernando da Costa Leal, when he accompanied the celebrated German traveller Karl Mauch, in an excursion from the Transvaal to Lourenço Marques, had opportunities of observing that insect. According to him the bite of the tsetsé fly is only fatal to certain species of animals, producing in man nothing but a slight inflammation which disappears on bathing the affected part in cold water. Ammonia is a powerful neutraliser of poison inoculated by the sting or bite, not only of insects, but even of poisonous reptiles. It appears, however, to have but little effect on the poison of the tsetsé fly. Karl Mauch administered ammonia to an ox stung by that insect, but without favourable results.

Agriculture is carried on among these people in primitive simplicity, but notwithstanding this, the negroes succeed in obtaining abundant crops, owing to the remarkable fertility of the soil. Their mode of sowing is as follows: as soon as the floods of the river recede, and the land appears, they make shallow holes, into which they drop a few grains of wheat, and afterwards cover them with the soil. Besides wheat, they sow the greater millet—which grows there and is as good as that

of the Cape—the smaller millet, haricot beans, gourds, and rice.

The chief of Cazembe is styled emperor, and is subject to Malianvo. The latter, although he enjoys a great reputation among the people he governs, has but very limited power. He receives some presents from the chiefs who, when expedient and in fear of other chiefs, invoke him as a hobgoblin.

The empire of Monomotapa—that is, of the Lord of Matapa, the words mona, moata, moene, morin, all being derived from the Hebrew word "moraina," signifying Lord—is composed of small settlements with a species of mayor for each one, whose duty it is to collect a tribute of rice, wheat, &c. The country is called Chidima, and is not very extensive. When Dr. Livingstone visited it, the chief had a hundred wives. The government is a description of feudal republic. Slavery is hereditary, but there is a middle class of free men. The nephew, a son of the chief's sister, succeeds on the death of the chief, and never the son of the latter. They explain this custom by saying that there must necessarily be a degree of consanguinity between the chiefs and his sister's sons, whereas there might not be any as regards his own sons.

Zumbo is a village now partly in ruins, though once in a flourishing state, through its commerce. It is situated about 60 leagues above Tete. It was founded by a native of Goa named Pereira, who, at the head of a body of men, came and established himself there. Six leagues distant from Zumbo are the celebrated mines of Parda Pemba, from whence much gold was formerly obtained. They are now abandoned, showing that there is at the present time but little gold in them.

Tete is situated on a slope descending to the Zambese. The houses are built on the crest of the rock. The fort on the bank of the river is dominated by the hill. To the south of the town there is a very deep valley, beyond which rises an oblong mountain named "Caroeira." There is abundance of calumba in the neighbourhood of Tete, which is used for dyeing purposes, and is better known by the name of colombo. It is the root of a plant called by Lamarck *Menispermum palmatum*, and in trade is met with in the shape of small discs of an inch and a half in diameter, or in pieces of two to three inches, covered with a thick kind of yellow bark, easily detached with the finger, under which is seen a wrinkled skin of either a brown or olive colour. The taste is bitter, and the smell unpleasant. Planche says it contains starch, gum, an element of bitter yellow material, volatile oil, salts of lime and potass, oxide of iron, silica, and a fibrous matter similar to flax. It acts on the body as one of the best tonics, but if used in large doses the colombo-root produces nausea and vomiting. Properly taken, it strengthens the organs and efficaciously destroys the atonic diseases of the stomach and intestinal canal. Drapier and Guibourt say that this substance has become very scarce in trade, it being fraudulently substituted by a similar article which comes from Algiers and the northern coasts of Africa. The latter differs from the true colombo, having a sweet acid flavour, very little smell, and does not turn blue when brought into contact with iodine, as it contains no starch. Colombo-root has lost somewhat of the fame of its virtues because of its being so falsified.

Near Senna, the Zambese contains numerous islands covered with reeds or canes. The soil is extremely fertile, but the stagnant waters render the locality insalubrious. About 400 paces from Senna, on the western side, is the mountain "Baramuana," from which a most enchanting landscape is seen. Some 20 or 30 miles distant the "Morumbala," a mountain of volcanic origin, whose highest parts are cultivated by the inhabitants, is discovered. On this mountain there is a spring of warm and sulphurous water. The mountains of the Maganjas stretch away towards the north, and approach the river in the neighbourhood of Senna.

DUPRAT.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

March 9th, 1874.

RAILWAYS IN PERU.

THE PRESIDENT took the chair at 8.30 p.m. Among those present were His Excellency Don Pedro Galvez, the Peruvian Minister, Dr. Gonzalez de la Rosa, Mr. H. H. Gibbs, Lord George Hamilton, Lord Cottesloe, Sir Harry Verney, Mr. Keith, Mr. Hutchinson, and Colonel Church.

The first paper was entitled "Across the Andes from Callao," by Thomas J. Hutchinson, Esq., H.M. Consul at Callao.

The most masterly sketch which I have read, of the programme to be adopted by Peru in her great system of railways—initiated more than fifteen years ago—is contained in a pamphlet written by the existing President of the Republic, when he explored the province of Jauja in 1861.* In it he speaks of the three great lines to cross the Andes:—first, the track suggested from Chala, which was afterwards changed to Mollendo, to go through Arequipa, and Puno to Cuzco; second, the one now in progress from Pacasmayo by Magdalena to Cajamarca; and the third, to Junin, which was to include the provinces of Jauja, Tarma, Huanuco, and Huancayo, together with the district of the silver mines of Cerro de Pasco. It is to the last mentioned, which comprises the stupendous works already done, on the road from Calloa to the Oroya station that this paper chiefly refers.

In the *brochure* just alluded to the author expatiates on the riches of the Junin department, as being more worthy to excite the attention of the Peruvian Government, as well as of capitalists and speculators, than any other part of the Republic. He enumerates the peculiarities of each of the provinces contained therein—describing their geographical relations with one another, as with the rich valley of Chanchamayo, and more especially with the province of Jauja, which was the particular object of his study. The valley of Jauja he describes as a garden, exceeding 40 square leagues, or above 360 miles in extent, variegated by picturesque residences, surrounded by trees, and its magnificent river set off by the charming vegetation on the hills that skirt its course. The mineral riches of the silver mines of Cerro de Pasco; of the quicksilver at Huancavelica; of the copper at Tuctu-Cocha, as at Moro-Cocha, are likewise described. In the last-named place coal has been found, of which Don Manuel writes as equal to that of Newcastle. The distance, as the condor (not the crow) flies, from Lima to Jauja, is above 20 leagues, or a little over 60 miles; but the road which mules had to travel was beyond 50 leagues, or more than 150 miles. The valley of Jauja is 17 leagues beyond the highest peak of the Andes to be crossed in the transit to it. We can therefore scarcely wonder that the freight of goods on this journey, at the time indicated, was charged 80 dollars per ton, or "from Lima to Jauja, four times more than it would cost from Callao to Liverpool or China."† Then he goes on to prove what beneficial results must ensue from the introduction of a railway into these regions, and with those points discusses the peopling of the Amazon Valley. The two grand ideas, entertained by Señor Pardo, in reference to the three lines of railways to which I have

* Estudios sobre la Provincia de Jauja, por Don Manuel Pardo. Lima, Imprenta de la Epoca, 1862.

† Op. cit. p. 23.

alluded were, that, in conjunction with the development of the mineral wealth of Peru, they should introduce colonization into those parts of the Amazon valleys which belonged to his country, as on the sea coast they might be joined together by a line running parallel with the Pacific Ocean. This last-named idea was originally suggested by Mr. William Wheelwright, whom Señor Pardo appropriately designates "the Hulton of South America." But this has been better supplemented by another and more practicable institution, originated and founded by the same Mr. Wheelwright, namely, the excellent service of the Pacific Steam Navigation Company. It effects an almost daily communication and intercourse along the whole shore of the Southern Pacific, from the Straits of Magellan to the Isthmus of Panama. And although commencing its career in 1840 with only two steamers, the 'Chile' and the 'Peru,' it has now sixty vessels—one of the finest fleets of merchant squadrons in the world.

So far back as 1856,* however, Señor Malinowski had been commissioned by the Government to give a report on the works of public utility in Peru; more particularly on the roads of communication along the coasts and to the interior.

In his report on the Central Transandine Railway Line, Señor Malinowski observes:—"On a simple inspection of the map we can notice the importance of the position, called Oroya, to satisfy all the exigencies of a general head-quarters position at the other side of the Cordillera. From thence branches can be made in three principal directions; and evidently the most direct way from Lima to Oroya, that by the valley of the Rimae, is the preferable one."

The Oroya line, as well as the two others alluded to in the first part of this paper, are all in the hands of Mr. Henry Meiggs, a citizen of the United States, who may be entitled "the Railway King of Peru." The contract for the Oroya line was given to him on the 18th of December, 1869, with the conditions that the road should be completed, and its equipments finished, in six years from the date of signing, the price to be 27,600,000 soles (about five millions of pounds sterling), in Peruvian bonds—the work to be done in pursuance of the details and specifications laid down by the Government engineers.

Mr. Hutchinson then described some of the extraordinary engineering works by which the railway is carried over the Andes, and his paper was illustrated by diagrams. The line goes from Lima to Coca-Chacra, up the valley of the Rimae, and thence to the Chosica bridge, 26 miles from the capital. The bridge is 262 feet high, and the line approaches it by a tunnel in the solid rock, and leaves it by another. Thence to Surco is a distance of 4 miles. From Surco to Matucana the line accomplishes an ascent of 1100 feet in 12 miles. Matucana is 7788 feet above the sea. From Matucana the line runs on through tunnels and over bridges, gaining height by zigzags. From Matucana to San Mateo a height of nearly 3000 feet is gained in 15 miles. The latter place is 10,530 feet above the sea. A little further on the river passes between two perpendicular walls of rock 1500 feet in height. A tunnel is here cut through the mountains, and the line is taken across the chasm by a bridge of 160 feet span, and 165 above the water, to enter another tunnel in the perpendicular rock on the opposite side.

The scene in this passage must be something indescribable, with the sensation of that momentary glimpse of sky whilst crossing in mid-air out of one gloomy cavern into another, with the bare glimpse of nearly a thousand feet high of Cordillera wall towering above the train. The line between Casapalca and Rio de Visca, crosses the summit in a tunnel 15,650 feet above the sea, and 104¼ miles from Lima. The tunnel is three-quarters of a mile long, and the highest portion of the mountain above it is 680 feet. Thence the distance to Oroya is 30 miles.

That the government of Señor Don Manuel Pardo does not mean to allow this railway to be limited to Oroya is evident from the fact of a law passed by Congress on the 30th of April last (1873), in which, amongst other lines, it is authorised to construct a railway from Oroya to Pasco (already mentioned as the great silver district), with a line from Oroya to Jauja and Huancayo. That it will eventually be extended through the valleys of Chanchamayo, Moyobamba, Loreto, and the many rich stretches of land that constitute the small world contained in the Amazon district, I have not the slightest doubt. The latest summary which I have read of what has been done, and is doing, amongst the tributaries of the Father of Waters, is an excellent and clearly written article in *Ocean Highways* (number for October, 1873, p. 265), by Lieutenant Don Juan Salaverry, of the Peruvian Navy.

The other line to Caxamarca is in rapid progress. In a couple of years more we may expect to hear of the Peruvian President going on a trip from Lima on the Oroya Railway, and passing through the tunnel beneath the lofty summit of the Chuquichuco, stretch out the right hand of fellowship, not only to all the nations of the Amazon Valley, but to those at the other side of the wide Atlantic, into which the mighty waters of the great river are discharged. The civilised world will then give its meed of tribute to the intelligence and wisdom of the Peruvian Government, and to the indomitable energy of her great railway contractor, Mr. Henry Meiggs.

The second paper was entitled "Railroad and Steam communication in Southern Peru," by Clements R. Markham, C.B., F.R.S., Secretary. While the railway described by Mr. Hutchinson will connect the capital of Peru with the valleys of Tarma and the mines of Cerro Pasco, the great work which has just been completed in the south of Peru, will bring the mineral wealth of Bolivia, and the rich products of the eastern valleys into direct communication with the Pacific ports.

The central region of the Peruvian Andes presents an aspect very different from that to the south and on the Bolivian frontier. In the centre the space between the Maritime and Eastern Cordillera is comparatively narrow: it is broken up into deep, worn valleys and profound ravines, where wheat, maize, and even sugar-cane, are grown in the different zones of elevation. But the southern part of the Peruvian Andes and the northern portion of Bolivia present a very different character. From the Vilcañota knot, the Andes separate into two distinct chains, namely, the Maritime Cordillera and the Eastern Andes, which include the loftiest peaks in America. The region between these two ranges contains the great lake of Titicaca, and consists of elevated plains intersected by rivers flowing into the lake, at a height never less than 12,000 feet above the sea. It is usually called the Collao, from one of the tribes which occupied it in ancient times. The surrounding mountains contain inexhaustible stores of copper and silver, the plains afford pasture for large flocks of alpacas, while the inner slopes of the Eastern Andes produce the best Peruvian bark, coffee, cocoa, coca, arnotto, and are watered by streams containing gold dust in large quantities.

It has long been an aspiration of the best Peruvian statesmen to see all this wealth borne over lake Titicaca by steamers, and across the frozen plains of the Maritime Cordillera by some more expeditious means than is afforded by the backs of llamas and mules. Nearly thirty years ago Don Manuel Costas, the present Vice-President of Peru, made an attempt to place a small steamer on the lake. He foresaw that, if this could once be done, a most important trade would spring up, which would give fresh life to the people of this classic land. All the products of the Bolivian forests—timber, chin-

* "Documentos Legislativos sobre el Establecimiento y la Mejora de las Vias de Comunicacion en el Peru." Lima, 1856.

chona bark, chocolate, coffee, coca, fruit and arnotto—would be conveyed to Yuao; and European manufactured goods, the maize of Cuzco, the aguardiente of the coast valleys, and the sugar of Abancay, would be sent in exchange to the Bolivian ports. There would, also, be a brisk trade in wool, silver, and copper; and a traffic in provisions of all kinds between the Indian villages near the shores of the lake. Timber in vast quantities might be felled and sawn in the forests of Caravaya, and floated down the rivers of Azangaro and Ramiz during the rainy season, which, with the coal on the island of Loto, would furnish supplies of fuel. A railroad across the Andes, connecting the steam navigation of the Titicaca Lake with the ports of the Pacific, was a stupendous undertaking which, even fifteen years ago, was scarcely dreamt of by the most enthusiastic speculator. Yet the whole of these schemes have not only been undertaken, but are now completed and actually in working order.

The railroad from the port of Mollendo to Arequipa has been completed some years. Mr. Meiggs accepted a contract to construct a railroad across the Andes, from Arequipa to Puno, for 32,000,000 soles (6,400,000*l.*), or 29,500*l.* a mile. The cost of transport, labour, materials, and provisions was, of course, enormous. The distance from Arequipa to the shores of lake Titicaca is 217 miles, and the works were commenced on June 7th, 1870.

After leaving the city of Arequipa the line crosses the river Chilé by a superb viaduct 1505 feet in length and 70 feet above the river bed; and there are three other viaducts of equal magnitude, all constructed in the United States, and conveyed to their sites with infinite difficulty. Embankments of various heights, from 50 to 500 feet, are numerous, and, in some cases, the rough and steep slopes are overcome by reverse tangents. In one place there is a cutting 84 feet deep, on the side of a precipice, with the roadway 1000 feet in perpendicular height above the valley. The longest tunnel is only 300 feet from mouth to mouth. Extraordinary difficulties had to be overcome, as may well be supposed when the inaccessible nature of the country is considered, the long distances without water, the heavy snowstorms, the absence of roads, and the intense cold of the loftier portion. From Arequipa to the baths of Yura, a distance of 17 miles, there is no water, and up to this point the costly expedient was adopted of conveying it to the works on mule-back. The same thing was necessary from Caniaguas for 26 miles. From 4000 to 5000 labourers, chiefly Chilians and Bolivians, have been constantly employed during three years and a half, and on the 1st January, 1874, the first locomotive reached the shores of lake Titicaca. The highest point on the old road from Arequipa to Puna is 15,590 feet above the sea, and that of the line selected for the railway cannot have been much less.

Meanwhile, active steps have been taken to establish steam navigation on lake Titicaca. In 1861, the Peruvian Government ordered two screw steamers in London (20 tons, 40 H.P.), called the 'Yaravi' and 'Yapura,' which were sent out to the port of Arica, thence to Tacua by rail, and finally the pieces were carried across the Andes on the backs of mules to Puno. But several pieces were lost, and the project remained in abeyance until 1868, when Captain Melgar, of the Peruvian Navy, was appointed to put together and launch the steamers. He set to work with zeal and energy. Those who have crossed the Andes, and seen the total absence of all resources at Puno, can form an idea of the difficulties that have been overcome by Don Manuel Melgar. He had to build a factory and a stone mole, and to bring up all the workmen and materials from the coast, the lake being 12,000 feet above the sea. The 'Yaravi' was launched in June, 1871, and the 'Yapura' on the 19th of March, 1872.

Their presence on these inland waters, together with the railway, will revolutionize the commerce of the surrounding provinces, knit the people of Peru and Bolivia together by common interests, and put new life into the inhabitants of the shores of Titicaca, the sacred lake of the Yncas. Markets and rapid means of communication having been secured, the trade of this region may be expected to increase rapidly on all sides. The face of the country will be entirely changed; the people, finding new wants, will become more civilized, and Puno, instead of a town with empty, silent streets and half-a-dozen reed *balsas* at its anchorage, will soon be a flourishing and busy port. When I was there, now nearly fourteen years ago, these prospects seemed far distant; but now, thanks to the energy of the Peruvian Government, and of the great contractor, Mr. Meiggs, they seem to be close at hand.

The cause of geography will be wonderfully advanced by these undertakings. At present there is no complete survey of the basin of lake Titicaca, which, in some important respects, possesses geographical interest. Lake Titicaca covers a superficial area of about 2500 square miles, being 100 miles long by 35 wide, and the surface is 12,196 feet above the sea. It is divided into two parts by the peninsula of Copacabana, the south division being 8 leagues long by 7, and united to the larger portion by the strait of Tiquina. A number of rivers, which are swollen and of considerable volume during the rainy season, flow into the lake; and the water is carried off by the drain or *Desaguadero*, which, after a course of 160 miles, empties into the salt lake and swamps of Paria or Aullagas.

The Desaguadero, connecting lake Titicaca with the Aullagas, is a very remarkable feature. At this great elevation land vegetation is stunted and scanty, but in the waters of the lake there are acres of tall rushes. The constant east winds blow all the dead rushes to the western side, where they mix with the living beds and form a dense tangled mass. Out of them flows the drain, with the surplus waters of the lake, and so, by a channel 160 miles long, connects Titicaca with the salt swamps of Aullagas. Davalos y Figueroa, a native of the country, who wrote in 1601, even speaks of the whole as one lake, saying that in one part, where it is called the Desaguadero, or drain, it becomes very narrow.

These features cannot fail to remind the meeting of the interesting discussion, in which Sir Samuel Baker took part on January 26th, on the subject of the supposed connection between the African lakes, Tanganyika and Albert Nyanza. The surface waters of Titicaca, like those of Tanganyika, are fresh; and, in Sir Samuel Baker's view, Tanganyika is connected with the Albert Nyanza, which is at the same level, by a channel analogous to the Desaguadero, flowing from Titicaca to the Aullagas swamp.

The Aullagas, which is the final receptacle of all the drainage of the Titicaca basin, is of course utterly unlike the Albert Nyanza, because it has no outlet, and is surrounded by Cordilleras of the Andes. It is salt, but it has always been doubted whether the large volume of surplus water flowing along the the Desaguadero can be disposed of by evaporation alone. Cieza de Leon, an accurate and trustworthy old soldier, who was in Peru shortly after the conquest, and wrote in 1553, mentions a report that, in some of the coast valleys of Tarapaca, there were streams, which were believed to be the waters of lake Aullagas, opening for themselves a way through the bowels of the earth. In his recent exhaustive report on the Tamarugal plains, in the Tarapaca province, Don Miguel Valle Riestra suggests a similar explanation, namely, that the waters of Titicaca, after draining into the Aullagas Lake, find their way by filtration to the lower level of the Tamarugal.

I have referred to these points in order to indicate how much there is of real geographical importance and interest which still awaits investigation in the region now at last brought within easy reach of the sea coast by a railroad. A thorough survey of the great lake of

Titicaca, and of its whole drainage area, is still a desideratum. Pentland went round the lake and fixed numerous positions, many years ago, but his was only a route survey; and d'Orbigny mapped the southern shores of the lake. When I first crossed this region, my duty obliged me to follow very much in the track of Pentland; and my latitudes and hypsometrical observations agreed satisfactorily with his, my heights being a few hundred feet less. But in returning, as soon as I went off Pentland's track, I came upon new features. Among these is the lake of Arapa, north of Titicaca, which is not on Pentland's map, though it is mentioned by Castelnau. Captain Melgar, the introducer of steam navigation on lake Titicaca, has made a survey of the coast from Puno to Jeli, and also confirms the accuracy of Pentland's observations for latitude. He has carefully examined the islands on the lake, especially that of Titicaca, the beautiful sacred island of the later Yncas, where artificial terraces, full of flowers, rise from the water's edge, tier above tier, to the hill tops, irrigated by channels drawn from the royal bath. All these classic spots around the sacred lake will now be explored and correctly mapped; and we shall at last get an accurate knowledge of this, the most interesting region, next to the Cuzco Valley, in all South America.

The valleys and wide forest-covered plains to the east of the Andes, in Caravaya and Bolivia, will also be explored. Beyond the work done by Don Antonio Raimondi and by myself, the vast and rich province of Caravaya is, so far as accurate geographical data are concerned, unmapped and unknown. Its wealth is enormous and inexhaustible; its rivers diverge to the point in the vast South American wilderness where Colonel Church is so ably and resolutely working to complete a railroad round the rapids of Madeira. Its more complete exploration will be a memorable geographical feat.

Now that the Peruvian Government has provided the means of rapid communication from the coast to the interior, its enlightened President, Don Manuel Pardo, has resolved to invite European explorers to judge for themselves of the resources of the ancient empire of the Yncas. An important decree was issued at Lima on January 13th, 1874, enumerating the lines of railway that are now actually open, as well as those in progress.

1. From the port of Ylo to Moquegua.
2. From the port of Mollendo, by Arequipa, to Puno.
3. From Pisco to Yca.
4. From Callao to San Mateo (on the way to Oroya).
5. From Chimbote to Taquilpon.
6. From Pacasmayo to La Viña (on the way to Caxamarca).

The decree announces that, as the districts traversed by these railways abound in mineral wealth, it is desirable to bring to the notice of European enterprise the character and extent of the riches to be found within the territory of Peru, and the means of communication which place these riches within the reach of private enterprise. With this object, lithographed plans of the Peruvian railroads, accompanied by sketches of the most prominent engineering works on them, and brief descriptions, are to be published in English, French, and German. Collections of samples of the principal minerals and coal found in the districts traversed by the railroads are also to be made in triplicate, by Don Antonio Raimondi, the State Geologist, and placed on exhibition in London, Paris, and Berlin.

The Fellows of this Society will heartily applaud the action thus taken by the Peruvian Government; for not only will it at once supply us with a large amount of new geographical information; but it will tend, in its results, to the mapping and exploration of regions now little known, but which yield to none in the world in interest and importance; whether we regard their physical structure, the magnificence of their scenery, the grand scale on which nature has worked within their limits, or their inexhaustible riches.

The President said that those who were well acquainted with the principal passes of the European Alps might form some idea of the difficulties which had been surmounted by railway engineers in Peru, in carrying the line over an altitude higher than Mont Blanc, which had just been described.

Mr. Hutchinson said that the most eloquent written description could scarcely convey any idea of the wonderful masses of rock through which the Peruvian railways have been made, or of the equally marvellous engineering work which had overcome the difficulties as they presented themselves.

His Excellency Señor Don Pedro Galvez (Peruvian Minister) said it was to him a remarkable spectacle to observe a scientific society like this taking so much interest in the progress of a distant country. It had been at all times the noble object of science to sacrifice time and labour to studies which, although they do not produce any immediate advantages to those who undertake them, create for humanity fountains of prosperity in the future. We had the examples of persons who have devoted their lives to geographical discovery or study, and such persons he thought merited the title of benefactors of humanity. As regards Peru, the authors of the papers they had just been listening to, have devoted a considerable portion of their lives to researches in that country, the results of which were embodied in works which have obtained a well-merited reputation. Mr. Markham had treated in the most practical manner the geographical questions in connection with the actual condition of nations, and had thus obtained, not simply a distinguished place amongst the geographers of his country, but had also won in the New World the estimation and gratitude of that continent. Mr. Hutchinson also, during the intervals of his official duties, had been enabled to devote a considerable portion of his time to the study of Peruvian geography and history. He would honour, then, in these individuals, all the members of a society whose object is the study of all parts of the world, free from every feeling of selfish interest. But it was also his duty to thank this meeting in a special manner for the interest with which it had listened to everything that had been said with reference to Peru, the progress of its public works, and the administrative career of its Government. Fulfilling its duty, and responding to the aspirations of the country, the Government of Peru was employing every means to stimulate activity in all branches which could contribute to its general progress. Railways had occupied the principal attention of the Government, and they had already progressed considerably, as was shown by the fact of there being now 1056 miles of line completed; and as many more would be completed within the next two years. The great Cordillera has been crossed in different parts, and communication between the rich localities of Peru will facilitate their development, and encourage reciprocal internal and external commerce in Peru. But railways were only a means of transport, and our thoughts must necessarily turn to what products there are to be transported. The mines and the agriculture of the country are the sources destined to supply the elements of progress to commerce, as well as the advantageous development of the railways; and the Government in its operations has paid the utmost attention to each of these sources of wealth. It is well known that at the time of the discovery of Peru, its minerals pre-eminently excited the attention of its conquerors. Its gold seduced them, and devoting themselves exclusively to its search, Peru became proverbial as the country of gold, as though the other sources of wealth characteristic of its soil had been entirely overlooked. Vessels, laden with the precious metal, sailed for the mother country every two or three years, taking from ten to fifteen millions of hard dollars (from two to three millions sterling), exciting the avarice of the rest of the world. What a small amount that sum of gold was, compared with the present product of

some of the other branches of commerce in Peru. The precious metals, which at the present time are worked as extensively as they were during the period of Spanish government, occupy the fourth or fifth place amongst the articles of export from Peru. But an immense future is now opened to these precious metals, by the introduction of railways, in reducing, very considerably, not only the cost of transport, but also of their production, and this will lead to the re-opening of many of the formerly abandoned mines, which will give the most beneficial results. Already companies are being formed here to work mines, which will return incalculable dividends to the capital invested therein, and it will not simply be the mines of precious metals which give these great results, but all kinds of minerals, stones, and above all, the coal which exists, of the very finest quality, in the interior of Peru, and which only await the reduction of the cost of carriage to the coast in order to become of the utmost importance. The Government, with the view of facilitating the formation of these companies, and the investment of those capitals for the general good, had ordered to be sent to Europe a collection of minerals, which will serve as a base for scientific persons to estimate these advantageous speculations. When these collections reach me, I shall have great pleasure in announcing their arrival to various scientific societies like this. Agriculture, which may be termed the most solid base of the prosperity of States, occupies in Peru a position second to none, as regards its quality, its variety, and the extent of its products. The immense Cordillera divides the country into three regions, each of which contributes its special products. This renders every cultivation possible in Peru, because there are all kinds of climate, and every variety of soil, but these are not sufficient to obtain an abundant production—hands are also required, and of these we are in great want. The Government of Peru had made the most laudable endeavours to attract immigration; but if the efforts have not yet been successful, we might now expect a better result, with the increased facilities of communication, and with the more extensive knowledge which one country consequently obtains of another, and with the results of past experience. For this purpose, the last Congress of Peru voted a specified sum towards promoting European emigration, and the Government has taken adequate measures to encourage that which will be most specially advantageous to the country, namely, agricultural immigration. I need hardly say, in speaking of immigration, that we consider our endeavours are best employed in obtaining that which comes from countries like England, whose flourishing colonies have become great States, and at the present moment exhibit, in their dependent provinces, the most solid principles of liberty and progress.

The commerce of Peru has progressed in proportion to the increase of its products and the facilities of transport. Speaking only of its connection with England, the importance of the commercial relations between the two countries has doubled in the last thirty years; and if Peru already occupies a distinguished position amongst the nations trading with the United Kingdom, we may well hope a few years will place her amongst the most prominent. This progress is due in a great measure to the wonderful advancement of maritime and telegraphic communications. Thirty years ago, two steamers of 800 tons made monthly voyages along the Pacific coast, whereas now there is a fleet of over seventy steamers, some of which are 3000 or 4000 tons, making daily voyages on the coast, and bringing all those ports into constant communication with each other. The communications by the Isthmus of Panama being insufficient, other lines of steamers have been established, *viâ* the Magellan Straits, which more directly connect the coast of the Pacific with the rest of the world. Telegraphs had made progress corresponding to navigation and railways. The telegraphic cable now extends from Europe to Panama, and the Peruvian Government had lent its protection and every possible facility for the laying of a cable between Panama and the coast of Peru, which is to be completed within two years, and connected with the telegraphic communication already existing in the interior of Peru. While speaking of this progress there was no motive for the existence of any individual or personal vanity, or for any government or for any one generation taking credit more than another. Each one fulfils the destiny allotted to it; and whilst we take advantage of the works of those who preceded us, and of the assistance, the instruction, and the resources of other countries, we should commence by acknowledging the benefits received, appreciate them at their full value, and solicit their continuance. The interest which had been shown by this Society in all that had been said about the state of Peru, appeared to him to show how great a part of her advancement was due to England; and whilst making this sincere acknowledgment, he trusted that the members of the Geographical Society, who contribute so largely to the pacific relations of all the world, would receive this expression of his country's gratitude.

Mr. KEITH said the wealth of Peru really consisted of its minerals, which were to be found in the Cuzco Valley and on the eastern slopes of the Andes. In crossing the Cordilleras he had seen ample proof of this, and he considered that the money Peru was now spending in developing her mines and extending her railways was much better used than in revolutions and bloodshed. He had entire confidence in the ability of the country to carry out all the undertakings which had been projected.

Colonel CHURCH said he had visited all the country which had been described in the papers, and had travelled over nearly all the Peruvian railways, and could bear his testimony to the stupendous nature of the engineering works that had been undertaken in that country. The fact that two of the lines already reached an elevation higher than the summit of Mont Blanc was something to excite astonishment. The railroad of which the United States was so proud—the Union Pacific—attained only half that elevation. Lake Titicaca, the borders of which might now be reached by railway, is 12,505 feet above the level of the sea; while the summit-level of the road is 14,600 feet. Beyond that, however, on the eastern slope of the Andes, were the real riches of the country; and he had no hesitation in saying, that, when the railways of Peru reached the summit of the Andes, the development of the country would really begin, for the coast would then be in connection with the outlying feeders of the Amazon, and in the valleys drained by the head waters of the Amazon there were greater riches than were ever dreamed of. That region was entirely unexplored, but Peru was making noble efforts to demonstrate to the world the navigability of her rivers and the riches of her mines. The Amazon Valley had attracted great attention recently in the United States. Last November he had an interview with the President and the entire Cabinet, and explained to them the efforts which were being made to construct a railway, 153 miles long, around the cataracts of the Madeira. The President promised to call the attention of Congress to the subject, and this promise he fulfilled. He requested an appropriation for the purpose of making an exploration of the Amazon as far as the mouth of the Madeira, and of the Madeira as far as the Lower Falls, beyond San Antonio, a point 1500 miles from the mouth of the river. An auxiliary expedition was intended to cross the Andes by the Arequipa Railway, and all that vast river system which concentrates at the head of the Maderia. Application had been made to the Governments of Bolivia and Brazil for permission to send the expeditions, and no doubt Congress would make the necessary appropriation. The Bolivia and Madeira Railway, with which he was connected, would, when

completed, open up 400,000 square miles of territory as rich as any other part of the world of equal size.

Sir Harry Verney said he had no doubt that the statements which had been made with regard to the enormous wealth of the eastern slope of the Andes were perfectly correct. He had seen a great deal of the mining operations carried on in the neighbourhood of Coquimbo, and he felt convinced that if the European method of mining could be introduced into South America, enormous riches might be extracted from the hills. The only mode of getting the water from the deep mines of Coquimbo was to make great fissures in the rock and employ naked Indians to bring up the water in skins. The part of the Andes which he had crossed was to the south of lake Titicaca, and was a great deal higher than that referred to by Mr. Markham. He crossed it in winter, and at the highest point the snow was then 600 feet deep.

Mr. Markham said that the cause of geography was greatly indebted to the President of Peru, Don Manuel Pardo, for the energy with which he had urged on the construction of the railways in spite of such stupendous difficulties. Don Manuel Pardo was not only a politician and an administrator, but he was also a good and sound geographer, and had written a memoir on the province of Jauja, which, for research, for the accuracy of the topographical details, and for the interest of the speculations which it contained, had seldom been equalled anywhere; the Fellows of the Society would therefore feel extremely gratified to know that the Council proposed to elect the President of Peru as an honorary corresponding member.

March 23rd, 1874.

On the Island of Yezo, and Progress of Geography in Japan.

The President took the chair at 8.30. Among those present were His Excellency, Count Munster (the German Ambassador); Mr. Watson (lately acting Minister in Japan); Sir Rutherford Alcock; Mr. Mitford, the Japanese Chargé d'Affaires; Mr. Luzuki Kinso, Secretary of Legation; Sir Henry Rawlinson; Captain A. H. Markham, R.N.; and the Bishop of Madagascar.

Mr. R. G. Watson read a paper "On Notes of a Journey in the Island of Yezo in 1873, and on the Progress of Geography in Japan." The author visited Yezo, the northernmost of the three main islands of Japan, last summer, and witnessed the results of the recent efforts of the Japanese Government to colonize the island. At present Yezo is placed on a different footing from that of all the other portions of the Mikado's dominions, being considered rather as a colonial possession, and governed by a special office, called the Yezo Colonization Department. Although richly wooded and picturesque, abounding in coal and other minerals, with salmon and other fisheries of surprising abundance, it is but very thinly populated, and would have continued in its neglected condition had not the Japanese Government been stimulated to action by the encroachments of the Russians in Saghalien, immediately to the north of it. The population does not exceed 124,000, of which number 16,000 belong to the singular aboriginal hairy race, called Ainos. The island is of about the same size as Ireland. Although lying ten degrees more southerly than Ireland, its climate is much colder; and Mr. Watson was glad to sit over a fire even at noon in the dog-days, and to sleep under a thick quilt at night; still the mangolia grows in its forests, and rice and maize are cultivated. He advocated the removal of the capital from Hakodate to Endermo, the latter place being more central, and having a magnificent harbour. With regard to the progress of our knowledge of the interior of Japan generally, the author said that Europeans are still forbidden to travel beyond the limit of 30 miles from the treaty ports; nevertheless, on one errand or other, Englishmen and Americans have traversed the largest island in various directions. In conclusion, he described the surprising change that had come over the attitude of the Japanese regarding foreigners. A few years ago, every traveller, even in the Yedo streets, carried, as it were, his life in his hands, and officials were forbidden to stir out without an armed escort: at present any foreigner can traverse, alone and unarmed, town or country without the slightest risk.

Mr. Motono Morimichi and Mr. Luzuki Kinso expressed, through the President, their surprise and gratification at the interest shown by the audience in Japan.

Mr. A. B. Mitford and Sir A. Alcock also addressed the meeting.

French Geographical Society.

Meeting of February the 20th.

M. Henry de Longperier stated his views on the choice of a new initial meridian. He began by reminding the meeting that, for some years, the meridian had formed a subject of general discussion, and he gave a history of the various meridians adopted up to the present time. The first meridian adopted was that of Ferro, in the Canary Islands; but soon the seamen of each country, having to use astronomical tables computed for the observatory of their own country; they also adopted as their initial meridian that of their national observatory. At the Congress of Antwerp a proposition was made that the meridian of Greenwich alone should be used on charts, while the meridian of Paris alone should be used on maps. On the other hand, the Russians proposed the Straits of Bering for the initial meridian. M. de Longpérier thinks that France could give up the initial meridian of Paris, on condition that the new one should have no nationality.

When considering the figure of the earth and the history of its inhabitants, he thought that the most serviceable initial meridian would be one dividing into two parts the seats of ancient civilization: the basin of the Mediterranean and the basin of the Tigris and Euphrates. He reviewed the history of the eastern portion of the Mediterranean and the history of its western portion at a later date. He showed how the two parts of the basin had been separated in the administration of the Roman empire, as these had constantly been found apart in the political history of mankind; the eastern part, on the other hand, was divided between the Grecian-Christian, and the Muslim world.

M. de Longpérier proposed an initial meridian identical with the seventeenth degree east from Paris, which, in the south of Europe, passes between the Drina and the Drinus, in the north of Africa, through the bottom of the Syrt, at a point near to that where the altars of the Phileni have existed. He then stated the advantages which he thought such an initial meridian would afford. According to M. de Longpérier it would prove more convenient for the study of geography and history. Europe would be cut in two by such an initial meridian—the western portion would comprise the Christian world, Latin and German; the eastern portion would comprise the Oriental world, the Russians, Tartars, and Arabs. In North Africa, the two portions would correspond: on the eastern side, to Grecian Africa, including Egypt and Cyrenaica; on the western side, to Roman Africa; while to the south, it would pass between the Indian and the Atlantic Oceans. The 180° would also separate two groups, one including India, Indo-China, Australia, and Japan, and the other including America. The ground of M. H. de Longpérier's argument on an essentially geographical question is purely historical, which was pointed out in the discussion that ensued.

M. de Khanikoff rightly observed that astronomy and the science of navigation are by far more interested than

history in the question of the initial meridian. He said that the reason why the Geographical Society of St. Petersburg had recommended the meridian of Greenwich, or rather a meridian very little different from that, was the great number of geographical documents published with the initial meridian of Greenwich, and the fact that the most complete astronomical yearly tables contained in nautical almanacs are computed for the meridian of Greenwich, and these are used by all navigators.

M. PERIER also objected to M. de Longpérier's idea as it would cause complications instead of simplifying. In his opinion, if a new initial meridian were adopted the whole of Europe would be left on one side of that meridian.

M. MALTE-BRUN proposed that the question should be brought before the next international Geographical Congress.

Meeting of March 6th.

THE President, M. DELESSE, was in the chair, and the Abbé DURAND, one of the Secretaries, read the minutes of the last meeting.

M. DELESSE announced the results of the transactions of the Council on the subject of the members who are to compose a series of questions to be debated in the Geographical Congress of 1875. These questions will be distributed over six sections: the first comprises mathematical geography; the second, physical geography; the third, economical geography; the fourth, historical geography, and the history of that science; the fifth, teaching of geography; and the sixth, travels and explorations. He further announced a resolution of the Council to grant 10,000 francs for the preparation of the Congress.

The General Secretary then read extracts from a letter received by Admiral de la Roncière Le Noury, giving some further particulars respecting Francis Garnier. It appears that as soon as the small expedition under Garnier arrived at Tong-king, signs of distrust became manifest, which were soon followed by secret hostility, and, at last, by measures against which he on more than one occasion protested, but without success. Finding himself in such a position, and in order to escape being obliged to put to sea, he determined to avert the danger by means of a well-conceived plan. On the 21st of November, with about a hundred men, he captured the citadel of Hanoï, which was defended by several thousand soldiers. The great marshal—a deadly enemy of the French—and two of his partisans, the sons of Phan-Tau-Gian, were also captured. For more than six years these persons had been the instigators of all the insurrections in Lower Cochin China. The events that followed are little known. It is simple justice to bring forward the eminent services Francis Garnier rendered by the capture of the great marshal Nguyen-Tri-Phuong, who died on the 20th of December from the effects of his wounds. By taking him prisoner M. Garnier has apparently secured the success of the policy of the Government of Cochin China. The Admiral-Governor of Cochin China has recommended to Government that Francis Garnier be nominated a captain of frigate from the 21st of November, for the capture of the citadel of Hanoï. After the taking of the citadel, M. Garnier recommended rewards for the most meritorious of his companions in arms, thus adding one more to his many eminent qualities. The Société de Geographie has lost in M. Garnier one of its most active, devoted, and useful members, whose labours had been for the benefit of all nations.

M. LEVASSEUR tendered his thanks to the author of the letter, and wished to lay a proposition before the Society. He referred to the sum of 3000 francs voted to Francis Garnier for his travel to Tibet. In summing up Garnier's pecuniary sacrifices to the cause of geography, his exploration of the Yang-tsze River at his own expense, he concluded by proposing that the 3000 francs alluded to should be handed over to his family as a very slight indemnity.

The PRESIDENT recalled the services of Francis Garnier, who had so well deserved of science and of France, which was received with unanimous approbation.

M. GORCEIX then gave an account of Macedonia, Thessalia and Epirus, being a summary of his own explorations made in those portions of Turkey in the years 1870-1872. His object when travelling in those countries had been to fill up some blanks in the map of Turkey by Kiepert. The outlines of the region of Ekassia were wanting; other portions of the map of Turkey are as unknown as portions of the map of the interior of Africa. M. Gorceix traced his routes upon his own map as he had surveyed them by means of a pocket compass with cross staff, and of a circumferenter constructed by himself. This outline completes the map by Kiepert, where, be it said by the way, the Olympos and Gossa could have been drawn more accurately if Kiepert at the time of its compilation had made use of French works already published. M. Gorceix based his itineraries upon the position of the places already ascertained.

The field of his observations is the region of Ekassia, extending from one day's journey north of Larissa, between the Olympos to the east, the Pindos to the west, and the line from Zarkos to Amasi to the south. He entered the range of mountains by the passage of Danazi. The line of culminating heights extends in the general bearing north and south. To the north, four peaks emerge out of the range of mountains, of which Mount Pyronos is the highest. On the western slopes the soil is barren, cultivation existing only in the mountains of schist. The eastern slopes are far more fertile. These show metamorphic rocks, crystalline rocks, and schists, as well as sand, marl, and tertiary rocks, consequently vegetation is here luxuriant. Such being the composition of the soil, it is easily swept away by natural agents, hence the many ravines and varied watercourses. Kiepert has given quite a faulty drawing of the hydrography of that region. The torrent of the Shutza, descending from the last buttresses of the Pindos, falls into the Yakmuna, while other torrents go to the Nistritza. On the western slope the Xerais unites with the Xerandakouros.

The centres of population are of little importance. M. Gorceix fixed with the compass the positions of about fifty or sixty villages. There is only one town. Dissikkata is not a town, but only a very small village—what is called a *tshiflik*, or property of farmers. Most of the inhabitants are Greeks; Turks being found only in the tshifliks. Another element of the population, although unimportant in number, deserves notice. It is the Walachian shepherds, who are merry and frank, and sing at every feast, and who make use of the name of the Latin race. They informed M. Gorceix that they were Frenchmen. Such Walachian shepherds are found even in the Olympos. Here M. Gorceix observed the analogy of the tendencies of Panslavism in the Orient with the tendencies of Pangermanism in the Occident.

He further rectified the course of the Ayakmoun and that of the Nistrizza. The Ayakmoun passes between the mountains and issues in the plain of Servia. M. Gorceix noticed in that part of the country some villages with peculiar inhabitants. He described a defile which offers a passage for a route to be constructed between Macedonia and Saloniki. In the village of Tshurkli he made archæological discoveries—a temple of Esculape, and medals. In another village he found broken vessels under the bed of humus. At the village of Laya M. Gorceix again corrected the course of the river passing by.

Nowhere did the traveller see Albanians of a pure blood. The tongue generally in use is the Greek, but

Turkish is also spoken. The peculiar division of the centres of population is worthy of mention. Villages are either κεφαλοχωροι or tshiflik. In those of the first class, the peasant is landowner; in those of the second class, the peasant is not a landowner, the landowner being a man who does not cultivate.

H. D.

Bulletin of the French Geographical Society.

Adventures of Norwegian Fishermen in Novaya Zemlya.

From the pen of M. Hepp, French Consul at Christiania, we have, in the February *Bulletin*, an account of the adventures of seven Norwegian fishermen who accompanied the late Captain Tobiesen in his unfortunate trip to Novaya Zemlya in the summer of 1872.

Captain Tobiesen of the 'Freya' had completed his season's seal-hunting towards the end of September, and was on the point of returning to Norway, when he was beset by ice off the western coast of Novaya Zemlya. After every effort to get free had proved unsuccessful. Tobiesen announced to his crew, which consisted of nine men exclusive of his own son, that the provisions would, at the best, keep no more than four or five during the winter months. On hearing this, seven decided on leaving the vessel, and they were accordingly supplied with a boat, a couple of guns, some powder and shot, a compass, telescope, fourteen biscuits, some tea and molasses, a few pounds of bear's meat, a saucepan, kettle, hatchet, and a few boxes of lucifers. They then started off, leaving behind the captain, his son, the first seaman, and cook. Of the melancholy fate of these four men we have already made mention (see *Ocean Highways* for October, 1873, p. 308). The others, as will be seen, were more fortunate.

After dragging their boat over ice for about two or three leagues, they managed to put to sea, and turned their course southward towards Waigatz Island. Their slender stock of provisions was soon spent, but they providentially fell in with a bear and some seals, and these kept them alive during their cruise, which, however, darkness and frequent storms rendered one of great peril. Three weeks had elapsed (but without an almanac they were not quite sure of their reckoning), and they had travelled about 50 miles, when the party came in sight of two deserted huts on the coast of Goose Island. In these quarters they rested for about three weeks to recruit their strength, their feet being all swollen and some of their limbs frost-bitten. They killed a seal, two Arctic foxes and four reindeer, and no more game having ventured near, they set out southwards marching along the coast, two of the party carrying the guns and ammunition, and the remainder dragging along some sledges, found in the huts, laden with their goods and chattels. A terrible snow-storm soon arose, and the two carrying the weapons lost sight of their five comrades. The position of the latter was now very critical. Their only food consisted of a little reindeer flesh and lard, the weather was terribly severe, their clothing was much too scanty, and there was no water. Lots were cast to determine which way they should go—back or forwards—and Providence ordained that it should be the latter. At night a hole was dug out in the snow, and while one mounted guard to keep off bears and to prevent their being buried in snow, the rest slept. On the sixth night one of the party succumbed, and the survivors were so worn and enfeebled that they were obliged to leave their sledges and baggage behind, and proceed without them. But help was at hand. A day or two afterwards some sledge marks were discovered, and after following these for some distance they reached a hut inhabited by Samoiedes, three men, three women, and a boy. These solitary outposts of civilization spoke Russian, and greeted the tired travellers most cordially. Their hut was situated at the southern extremity of Goose Land, and they caught seals and walruses which they sold at Petchora. They sheltered the Norwegians till the month of March, when all the stock of firewood being exhausted, compelled them to pull down the hut and set up a tent of reindeer skins. One of the Norwegians fell ill, but the hospitable Samoiedes still continued to share their clothing and food with their guests, and even offered to go and bury the body of the Norwegian who had died on the way.

Towards the close of April the Norwegians were astonished by the arrival of the two who had been separated from them by the snow storm. Theirs was indeed a story of endurance. The two, Olsen and Nilsen, on finding themselves alone, with nothing but two guns and a pound of meat, had striven to regain the huts they had left. Nilsen was the first to arrive, and having lighted a fire and cooked some food, lay down to sleep; some hours after, Olsen, who, in the meantime to keep himself alive had eaten some of his coat of fresh reindeer skin, came up, but was too weak to enter the hut, and lay down to rest in the boat outside. After picking up strength a bit he managed to enter, and found Nilsen asleep by the fire, which was still burning. He ate the fragments of Nilsen's meal and soon fell asleep. The next morning the two sailors made preparations for their wintering. For a fortnight they were unable to kill anything, and subsisted on some scraps of food left by former tenants of the hut; but towards Christmas an inquisitive reindeer ventured too near and paid the price of his curiosity with his life. Fire was obtained by flint, steel, and some old rope, and fuel running short, a portion of the hut was pulled down, and the wood cut up by means of a knife, extemporized out of a piece of iron belonging to the boat, knocked into shape with a stone; a few nails were fashioned into needles, and reindeer skins supplied them with the material for clothes. Eleven reindeer and a bear were killed, and these afforded them food till April, when, having but three charges of powder left, they struck camp, and a few days later most fortunately fell in with their comrades.

Six weeks afterwards the frost broke up sufficiently to enable five of the Norwegians to go back and fetch their boat; this they brought with them, and putting out to sea, eventually reached the edge of the pack near Waigatz Island. Here they were entertained by another party of Samoiedes, who took them southward in reindeer sledges, and then put four of the rescued seamen on board a Norwegian vessel, two having remained behind, allured by the charms of Samoiede hospitality.

The Silver Mines of Caracoles in Bolivia.

In the month of March, 1870, some agents of Messrs. Diaz-Gana and Arnous de Rivière, whilst travelling in the southern part of Bolivia, hit upon some veins of silver, situated about 100 miles inland, and returned with the news to the port of Cobija. On hearing of this, Messrs. Diaz and de Revière started for the interior. They named the spot Caracoles, meaning in Spanish an assemblage of shells, from the great number of fossils discovered there. The proprietary rights of the mines have now passed into the hands of companies, M. Diaz having sold his interest for 300,000*l*., and M. de Revière, who stood out a little longer, for about 400,000*l*. There are four routes by which Caracoles can be reached. The longest one is from the port of Tocopilla, and along it relays of carts have been provided by a company in Valparaiso. The second, from Cobija, which is the only way into the interior of Bolivia from the south, attains a height of 5000 feet, and was, until latterly, practicable only for mules. The third is from Mexillones and along this line a railway is being rapidly constructed, and by the end of the year will be probably half done; although this is actually the shortest route of all, the curves which the railway has been obliged to take will greatly increase its length. The harbour of Mexillones is the best on the west coast of South America. The fourth and last route

is from Autofagasta or Chimba, and being provided with four post-stations is well frequented now, but will eventually cede, of course, to that from Mexillones, when the railway is built.

The mines discovered are of great promise, yielding from half to one per cent. of metal, while those first found were twice as rich.

Articles of food are still very dear in the district, but a change may fairly be anticipated, as the annual outturn of silver amounts in value to about 300,000*l*., at a working cost of about 40,000*l*. The population of the district is about 6000, the majority of which are Chilians.

Dr. Nachtigal in Central Africa.

THIS persevering German traveller has not only penetrated as far as Wadai, a country east of lake Chad, but has even succeeded in despatching from the town of Abu-Cher a letter to Europe by way of Tripoli. He does not state by what route he managed to reach Wadai, but it was very probable by the south of lake Chad, as the delta of the Shari in this direction is a feature which merited close investigation, and which the Doctor is pretty sure to have given his attention to.

Wadai is a poor country partly owing to the lack of water and partly to the lower state of civilization of its inhabitants. Their straw huts are very inferior to those of Bagharmi to the south, and the people themselves are cruel, suspicious of strangers, and quarrelsome. They are in the habit of drinking a sort of beer called *melissa*, which excites them so as to cause the Arab merchants to remain indoors until the close of the day for fear of encountering violence outside. But under the rule of the new Sultan Ali, a great change has been brought about. His punishments are extremely severe, and his firm hand has caused commercial engagements to be much more respected, and so has brought about increased intercourse with strangers. The credit of opening up communications between Wadai and the port of Ben Ghazi on the Mediterranean belongs to a former Sultan, Abd-el-Kerim Sabun. But now the caravans from Wadai take their slaves, ivory and ostrich feathers in the direction of Egypt.

Dr. Nachtigal has been trying hard to recover the books and papers formerly belonging to the traveller Edward Vogel, who was murdered at Abu-cher in 1856. As, however, the murder was committed by order of the present Sultan's father, the doctor's investigations had to be carried on carefully, for fear of offending Sultan Ali.

There is much disturbance and strife at present in Dar-Fur, the adjacent country to the east. Should matters become more quiet, Dr. Nachtigal will return through this country to Khartoum, in spite of the approach of the rains, which render travelling difficult. On the other hand, should there be no chance of succeeding in this direction, he will have to set out northward by way of Ujanga, Jalo and the Sahara to Tripoli, a very much more trying route and one which will render necessary the provision of a good number of camels.

Other articles in the February *Bulletin* are an account of the country to the south-west and west of Algiers, adjoining the empire of Morocco; an article on Anglo-Saxon colonization in the Fiji Islands, in which the author, M. Jules Girard, draws attention to the great advantage derived from these islands forming a coaling station for vessels plying between Panama and Australia and a description of the ethnographical museums of Moscow and Copenhagen.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

AT the General Meeting of this Society on the 21st of January last, when several distinguished Englishmen were present, H.R.H. the Duke of Edinburgh was unanimously elected an Honorary Member. The Secretary announced the return of Messrs. Prjevalski and Pyltsef from Tibet, and gave notice of the despatch of an expedition in the spring of this year to China, from whence it is to proceed along the banks of the Yang-tse-kiang River by Khamil to the Irtysh, exploring the country with the view of establishing a better system of commercial relations with China. The object aimed at is to divert all the Chinese trade from Kashgaria, by forming an entrepôt at a point somewhere to the east of Kashgar, from which the main traffic may proceed northwards. Messrs. Sasnofski and Matousofski, who are to lead the expedition, have already left St. Petersburg. The latter is well known by his recent explorations in the direction of Kobdo and Urumtsi.

The Secretary next read a letter addressed by the Vice-president to General Kaufmann, in which the Governor-General of Turkistan was requested to advise the Society as to the opportuneness and practicability of taking the best advantage of the great extension of the Russian dominions in Asia, and of the establishment of regular relations with the various Khanats by sending exploring parties from three different parts of the province under his charge, viz., from the Semirechensk district to Urumtsi, Turfan and Kashgar (this probably with a view to meet Messrs. Sosnofski and Matousofski), from the Naryn to Djetyshar [Kashgaria] and to the Oxus, as well as to its supposed ancient bed as far the Caspian Sea.

At a meeting of the Statistical Section of the Society, the Secretary read a communication from Mr. Baronofski on the subject of a Railway to Central Asia. Mr. Baronofski proposes to lay a line from Saratof on the Volga, across the Ust-Urt by Kungrad to Chardjui and Khilef. The total distance of this line would be 1500 miles. This project, however, met with no favour, for it is anticipated that M. de Lesseps will construct a line which, running along the northern districts of the Turkistan Province, with a feeder from Tashkend and Bokhara, will pass to a terminus somewhere in the north-eastern portion of Kashgaria, by which means Russia may develop her relations with China.

At a meeting of the Geographical Section of this Society, held on the 19th instant, General Heine, late in the United States Service, read a paper on the progress of civilization in Japan, in which he related the following remarkable story:—A young Japanese who was sent to America to study, receiving from his Government an allowance of 1000 dollars per annum, embraced Christianity and became a Methodist. According to Japanese law he was punishable by death. Considering he was bound to notify the fact to his Government, he wrote home and renounced all further claim to his allowance. The Government of Yedo thereupon instituted inquiries in America, into the manner in which the young man was following his studies; the result of these being in his favour, all the reply that he obtained from the Japanese Government in answer to his notification was an increase of his annual allowance to 1500 dollars.

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